	Minor Generic Elective Course (MNGEC)
Semester I	**ZOOLOGY (HONS.)**
Course	**Basic clinical Techniques**
Subject prerequisite	**To study Science in class 12**
Credits Allotted	**4 Credits [60 hours]**
Teaching Scheme	3 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**

Learning Objectives

The student at the completion of the course will be able to:

- Adjust to protocols and guidelines relevant to the assistant role in clinical practice
- Recognize the boundary of the clinical assistant responsibility
- Exhibit managing potential to risks to the quality and patient safety.
- Be aware of relevant legislation, standards, policies, and procedures followed in theclinics
- Engage and supervise other providers in order to maintain quality continued care.

Course content	**30 T + 60 P (Hours)**
Unit I. Health and Healthcare • Basic structure and functioning of the human body and healthcare in India; Biomedical terminology and abbreviation • IEC document and safety, Record keeping and report	3 Hours T + 6 Hours P
Unit II. Laboratory Safety System • Good laboratory practices, • Autoclave- Working principle, parts. • Deep freezers, Hot Air Oven • Biomedical waste disposal- Theory and Practice, waste segregation	3 Hours T + 6 Hours P
Unit III. Collection of blood for various tests • Collection of blood and other samples for analysis • Preparation of blood smears, Antigen testing, • PH meter- working and applications, Clinical relevance of blood PH • Labelling, Storage and Sample transportation	6 Hours T + 12 Hours P

Unit IV. Introduction to 24X7 Patient care • Ambulatory blood pressure monitoring; Clinical Laboratory Improvement amendments • Point-of-Care testing (Glucometer), oximeter, continuous glucose monitoring; maintaining data for sleep • Diabetes care understanding of hypoglycemia, itsconsequences	12 Hours T + 24 Hours P
Unit V. Care of Elderly • Anatomy of ear and hearing function. • Types of audiometers - Pure tone audiometer and speech audiometer, parts and operation of hearing aids. • National Programme for Health Care of the Elderly (NPHCE)	6 Hours T + 12 Hours P
SUGGESTED READINGS: 1. Text book of medical laboratory technology, Praful Godkar; Bhalani Bhalani Publishing House 2. Manual of FIRST AID: Management of General injuries, Sports injuries and Common Ailments LC Gupta, Abhitabh Gupta Jaypee	

ZOOLOGY (HONS.) **Semester I**	**Skill Enhancement Courses (SEC)**
Course	**Vermiculture and Vermicomposting**
Course Code: V1001016	
Subject prerequisite	**To study zoology in undergraduate, a student must have passed in class 12**
Credits Allotted	**2 Credits [30 hours]**
Teaching Scheme	2 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**
Course Objectives	1. The course would provide an insight to the learner about the vermiculture and vermicomposting. 2. It will help the student to understand how to startup of vermiculture and vermicomposting.
Course Outcomes	Upon completion of the course, students should be able to: 1. Acquire a critical knowledge on role of earth worms in making organic matter from 2. Biodegradable wastes. 3. Understand the biology of some important species of earth worms used in vermiculture. 4. Acquire skills on production of vermicompost. 5. Explain benefits and problems with vermiculture and vermicompost.

Course content	**Lectures (30 Hours)**
Unit I. Vermiculture - definition, meaning, history, economic importance, value in maintenance of soil structure.	04 Hours
• **Unit II. Biology of Earthworm:** Systematic position, Basic body structure of earthworm: General body plan, Prostomium, Peristomium, Metamerism, Cuticle, Setae, Different body pores, Clitellum, Digestive system of earthworms with special emphasis to gizzard, Life cycle and reproduction.	06 Hours
• **Unit III. Earthworm Ecology:** Distribution & Ecological categories: Epigeic, Endogeic and Anecic earthworms and their special characters, Food habit andecological niche. Ecological requirements: moisture, temperature, pH, organic matter etc, Ecosystem services i.e. role played by earthworms in soil ecosystem with special reference to four R's of recycling (reduce, reuse, recycle and restore).	08 Hours
• **Unit IV. Reproduction:** Life Cycle of composting worms, Hermaphroditism, Copulation and cocoon formation, Cocoon structure, Incubation period of cocoon in vermicomposting earthworms, Fecundity in surface dwelling (epigeic) and soil dwelling (endogeic and anecic) earthworms.	06 Hours

• **Unit V. Basic Concepts of Vermiculture & Vermicomposting:** Definition, History of vermiculture & Vermicomposting, Difference between vermiculture and vermicomposting, Selective features of earthworms for vermiculture and vermicomposting, Method of vermiculture of phytophagous and geophagous earthworm, Utility of vermiculture: Source of protein (Vermiprotein) for pisciculture, poultry farming, piggery etc., application in vermicomposting. Use of vermicompost with special reference to organic farming.	06 Hours

SUGGESTED READINGS:

1. Bhatt J.V. & S.R. Khambata (1959) "Role of Earthworms in Agriculture" Indian Council of Agricultural Research, New Delhi
2. Edwards, C.A. and J.R. Lofty (1977) "Biology of Earthworms" Chapman and Hall Ltd., London.
3. Lee, K.E. (1985) "Earthworms: Their ecology and Relationship with Soils and Land Use" Academic Press, Sydney.
4. Wallwork, J.A. (1983) "Earthworm Biology" Edward Arnold (Publishers) Ltd. London.
5. Kevin, A and K.E.Lee (1989) "Earthworm for Gardeners and Fisherman" (CSIRO, Australia, Division of Soils).

Activities	

- Individual laboratory work and visit to parks in public and private places, studying establishment of vermicomposting unit, facilities required etc., culminating writing and submission of a hand-written Field Work Report (vermiculture to vermicomposting) not exceeding 10 pages in the given method or format.
- Training of students by related industrial experts.

ZOOLOGY (Hons.) Semester I	**Value Added Course (VAC)**
Course	**Environmental Policies and Laws**
Course Code - P0001021	
Subject prerequisite	**To study zoology in undergraduate, a student must have studied Biology, and Life Science in class 12**
Credits Allotted	**2 Credits [30 hours]**
Teaching Scheme	2 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**
Course Objectives	The learning objectives of this course are as follows: 1. To explain the role of law, policy and institutions in the conservation and management of natural resources as well as pollution control 2. To introduce the laws and policies both at the national and international level relating to environment 3. To equip the students with the skills needed for interpreting laws, policies and judicial decisions
Course Outcomes	By studying this course, students will be able to: 1. To analyze advanced and integrated understanding of the complex body of knowledge in the field of environmental law 2. To develop the capacity to identify new law and apply existing law in the rapidly evolving legal context for environmental law 3. To understand in depth knowledge of the specialist area of environmental law and associated disciplinary areas 4. To determine and analyze the different causes of pollution and legal remedies to control it on national level.

Course content	**Lectures (30 Hours)**
Unit I. Basic Concepts in Environmental Law: An introduction to the legal system; Constitution, Acts, Rules, Regulations; Introduction to environmental laws in India; Stockholm conference; Bhopal gas tragedy; Rio conference. General principles in Environmental law: Precautionary principle; Polluter pays principle; Sustainable development. Overview of legislations and basic concepts.	06 Hours
Unit II. Forest, Wildlife and Biodiversity related laws Forest and Wildlife laws; Colonial Forest policies; Indian Forest Act 1927; Wildlife Protection Act 1972; Forest Conservation Act 1980; Biological Diversity	06 Hours

Act, 2002; Forest Rights Act 2006. Strategies for conservation–Project Tiger, Elephant, Rhino, Modulew leopard.	
Unit III. Air, Water and Marine Laws: National Water Policy; Laws relating to prevention of pollution, access and management of water; Water Act, 1974; Water Cess Act, 1977, Environmental Protection Act 1986. Pollution Control Boards; Ground water laws; Marine laws of India; Coastal zone regulations. Legal framework on Air pollution: Air Act,1981; EPA, 1986	06 Hours
Unit IV. Environment protection laws and large Projects: Legal framework on Environment Protection-Environment Protection Act as the framework legislation–strength and weaknesses; EIA; National Green tribunal (NGT) Hazardous Waste Management, Handling Rules 1989; Rules, Regulations and Guidelines for municipal Solid Waste, Electronic Waste	06 Hours
Unit V. International Environmental law: An Introduction to International Environmental laws; Necessity for International Environmental Court. United Nations Environment Programme [UNEP], Role on international environment laws. Case studies for International environmental disputes. Polluter pays.	06 Hours
SUGGESTED READINGS: **1.** Shelton, D. & Kiss, A. C. (2005). Judicial Handbook on Environmental Law, United Nations Environment Programme. **2.** Jaswal, P.S. & Jaswal, N. (2003). Environmental Law. Pioneer Publications, Delhi. **3.** Tiwari, R. K. (2007). Global Environmental Policies. ABD Publishers. **4.** Trivedy, R. K. (2004). Handbook of Environmental Laws, Guidelines, Compliance &Standards, Vol. 1 & 2 Environ – Media Karad, India. **5.** Kuttingayloan, G. M. (2009). Conventions, Treaties and other Responses to Global Issues, Vol. 1 & 2 EOLSS Publishers Co Ltd. **6.** Singh, G. & Singh, G. (2005). Environmental Law in India. Macmillan India. **7.** Sarkar, P.K. (2012). "Environmental ethics and environmental issues." International Journal of Multidisciplinary Educational Research 1.2. **8.** Reddy, R.V. (1997). Environmental movements in India: some reflections. FIA. Agricultural Meteorology by G.S.L.H.V. Prasad Rao: Published by –PHI Learning Private Ltd.	

	Minor Generic Elective Course (MNGEC II)
Semester II	**ZOOLOGY (HONS.)**
Course	**Parasitic Diseases and Health**
Subject prerequisite	**To study Science in class 12**
Credits Allotted	**4 Credits [60 hours]**
Teaching Scheme	3 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**

Learning Objectives

The learning objectives of the following course are:

- To overview of parasitic diseases and health.
- To enable students to understand the parasitic diseases.
- To learn the health issues or infections caused by different parasites under distinct phyla.

Learning Outcomes

By studying this course, students will be able to

- Learn about the importance of diseases caused by different parasitic groups.
- To understand the life cycle, pathogenicity and control measures of parasites and various health conditions.

Course content	**30 T + 60 P (Hours)**
Unit I. General Concepts • Introduction, Parasites, parasitoids, host, zoonosis • Origin and evolution of parasites • Basic concept of Parasitism, symbiosis, phoresis, commensalisms and mutualism • Life cycle of human parasites • Occurrence, mode of infection and prophylaxis	6T +12P Hours
Unit II. Parasitic Protists Study of morphology, life cycle, pathogenicity, prophylaxis and control *measures* of- • *Entamoeba histolytica* • *Trypanosomagambiense*	6T +12P Hours

• *Plasmodium vivax*	
Unit III. Parasitic Platyhelminthes Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of- • *Fasciola* • *Schistosoma haematobium* • *Taenia solium* • *Hymenolepis nana*	6T +12P Hours
Unit IV. Parasitic Nematodes Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of- • *Ascaris lumbricoides* • *Ancylostoma duodenale* • *Wuchereriabancrofti*	6T +12P Hours
Unit V. Biology, importance and control of • Ticks (Soft tick *Ornithodoros*, Hard tick *Ixodes*) • Mites (*Sarcoptes*) • Lice (*Pediculus*) • Flea (*Xenopsylla*) • Bug (*Cimex*) • Parasitoid (Beetles)	6T +12P Hours

SUGGESTED READINGS:

1. Barnes, RD: Invertebrate Zoology (4th ed.), Holt-Saunders, 1980.
2. Barrington, EJW: Invertebrate Structure and Function, Nelson, 1987.
3. Hickman, Roberts & Hickman: Integrated Principles of Zoology (7th ed) Times-Mirror, Mosby, 1984.
4. Iyer: A Manual of Zoology, Part I. Viswanathan, 1973.
5. Kotpal, RL: Modern Text Book of Zoology: Invertebrates, Rastogi Publications, 12th edition, 2019
6. Marshall & William: Text Book of Zoology, Vol I (Parker & Haswell, 7th ed.) Macmillan, 1972.

ZOOLOGY (HONS.) Sem II	**Skill Enhancement Courses (SEC)**
Course	**Aquarium Maintenance and fish keeping**
Subject prerequisite	**To study zoology in undergraduate, a student must have passed in class 12**
Credits Allotted	**2 Credits [30 hours]**
Teaching Scheme	2 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**
Course Objectives	1. To see and practice the paths that lead to the success of any entrepreneurship on live animals like ornamental fishes 2. To develop the knowledge of aquarium fish keeping techniques in an operational 3. Aquarium for more profit management, feed requirements, etc. 4. To make the students well versed in their practical skills starting from setting of aquarium.
Course Outcomes	Upon completion of the course, students should be able to: 1. enlighten themselves about the operation of setting, maintenance, feeding and biology of Ornamental fishes. 2. learn aquarium fish production and fish keeping industry which will generate a source of Employment opportunities in rural areas and employment. 3. understand the field level structure and functioning of insurance sector and its role in Protecting the risks. 4. Comprehend pertaining skills and their application for promoting insurance coverage.

Course content	**Lectures (30 Hours)**
Unit I. Introduction to Aquarium Fish Keeping • History of fish keeping; Scope of Aquarium Fish Industry as a cottage industry. • Types of aquaria (Salinity, Temperature, Species Selection & Location) • Aquarium setup and accessories. • Aquarium Filters and types of filtration methods (Mechanical, Chemical & Biological –Nitrogen Cycle); Precautions to be taken for an ideal aquarium; Criteria of selection for aquarium fishes.	6 Hours
Unit II. Aquarium Fishes	6 Hours

• Exotic and Endemic species of Aquarium Fishes (Exotic Aquarium Fishes – Puffer, Humphead & Siamese Tiger fish; Endemic Aquarium Fishes – Zebra Danio, Striped Panchax & Honey Gourami) • Common characters and sexual dimorphism of Fresh, brackish and Marine Aquarium fishes. o Freshwater ornamental fishes - Guppy, Gold fish and Angel fish. o Brackish ornamental fishes - Black Molly, Sword tail & Ray fish. o Marine ornamental fishes- Anemone fish, Moorish idol, & Butterfly fish.	
Unit III. Food, Feeding and Nutrition of Aquarium Fishes • Use of live fish feed organisms; • Preparation and composition of formulated fish feeds; • Qualities of a good artificial fish feed; • Nutritional requirements of fishes; • Live feed culture for fishes (Culture of Artemia sp.)	6 Hours
Unit IV. Maintenance of Aquarium • General aquarium maintenance; • Water quality management (pH of water, hardness, softening water, salinity, oxygen, carbon dioxide, chlorine, ammonia, nitrites, hydrogen sulphide, temperature)	6 Hours
Unit V. Aquarium Fish Diseases • Parasitic diseases; • Bacterial diseases; • Viral diseases; • Protozoan diseases; • Fungal diseases; • Deficiency diseases	6 Hours

SUGGESTED READINGS:

1. Home Aquarium and Ornamental Fish Culture (2015), Jayashree K. V., Tharadevi C. S., and Arumugam N., Saras Publication, Tamil Nadu, India
2. Training Manual on Freshwater Ornamental Fish Breeding and Aquascaping Techniques (2019), Haridas, H. et al, ICAR-Central Island Agricultural Research Institute, Port Blair, India
3. Aquarium : Fish Keeping C B L Srivastava Published by Kitab Mahal
4. Marine Aquarium (Fish: Keeping and Breeding Them in Captivity)
5. Boruchowitz, Davie. Published by Chelsea House Publications (1998)
6. Aquarium Setting Up (Fish: Keeping and Breeding Them in Captivity
7. Axelrod, Herbert R. Published by Chelsea House Publications (1998)
8. Aquariums: The Complete Guide to Freshwater and Saltwater Aquariums, Jan 2009 by Thierry Maitre-alain (Author), Chrisitan Piednoir (Author)

ZOOLOGY (HONS.) Sem. III	Minor Generic Elective Course (MNGEC)
Course	Conservation and management of wildlife
Subject prerequisite	To study Science in class 12
Credits Allotted	4 Credits [60 hours]
Teaching Scheme	3 hours/week
Examination Scheme	Internal Assessment: 25 Marks End of Semester: 75 Marks

Learning Objectives

The learning objectives of the following course are:

- To overview of wildlife conservation and management.
- To enable students to understand how to protect wildlife.

Learning Outcomes

By studying this course, students will be able to:

- Learn about the importance of wildlife.
- To understand the conservation, evaluation, management and protection of wildlife.

Course content	30 T + 60 P (Hours)
Unit 1: Introduction to Wild Life Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.	6T +12P Hours
Unit 2: Evaluation and management of wild life Habitat analysis, Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.	6T +12P Hours
Unit 3:Management of habitats Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity.	6T +12P Hours
Unit 4: Population estimation and management of excess population Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method. Bio- telemetry; Care of injured and diseased animal; Quarantine.	6T +12P Hours

Unit 5: Protected areas and management planning of wild life in protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve. Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence.	6T +12P Hours
Practical's: • Identification of flora, mammalian fauna, avian fauna, herpeto-fauna • Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses) • Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc. • Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)	

SUGGESTED READINGS:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Coexistence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences.
5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

ZOOLOGY (Hons.) Semester III	**Skill Enhancement Course (SEC)**
Course	**First Aid and Health**
Course Code	
Subject prerequisite	**To study zoology in undergraduate, a student must have studied Biology, and Life Science in class 12**
Credits Allotted	**2 Credits [30 hours]**
Teaching Scheme	2 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**
Course Objectives	The learning objectives of this course are as follows: 1. These skills allow for effective assessment, pain relief, protection of the unconscious, and the ability to manage a situation while professional medical help is on the way. 2. To preserve life, prevent further harm, and promote recovery by equipping individuals with the skills to provide immediate care in an emergency.
Course Outcomes	By studying this course, students will be able to: 1. To adjust to protocols and guidelines relevant to the assistant role in clinical practice 2. To recognize the boundary of the clinical assistant responsibility 3. To exhibit managing potential to risks to the quality and patient safety. 4. To be aware of relevant legislation, standards, policies, and procedures followed in the clinics 5. To engage and supervise other providers in order to maintain quality continued care.

Course content	**Lectures (30 Hours)**
Unit I. Basic first Aid: Aims of first aid laws, Dealing with an emergency, Resuscitation (Basic CPR), Recovery position, Hand washing and Hygiene, Types and contents of First Aid kit, Dressing and Bandages, Transport techniques	04 Hours
Unit II. First Aid related with Respiratory System: Basics of respiration, breathing difficulties, Swelling within throat, suffocation and asthma **First Aid related with Heart, Blood and Circulation**: Basics of heart and the blood circulation, chest discomfort and bleeding. **First Aid related with wounds and injuries**: types of wounds, small cuts and abrasions. Head, chest and abdominal injuries, fractures of bones	06 Hours

Unit III. First Aid related with Nervous system: Basics of the Nervous system, unconsciousness, strokes, fits (Convulsions, seizures and epilepsy) **First Aid related with Gastrointestinal tract**: Basics of the Gastrointestinal system, Diarrheas, Food poisoning **First Aid related with Skin and Burns**: Basics of skin, - Types of Burn, Frost bite and its prevention	06 Hours
Unit IV. **First Aid related with Poisoning**- poisoning by swallowing, gases, injections **First Aid related with Bites and stings**- Animal bites, snake bites, insect stings and bites. **First Aid related with sense organs**- basics of sense organs, foreign objects in the eye, ear, nose or skin, swallowed foreign objects	08 Hours
Unit V. **Specific Emergency Situations and Disaster Management**- emergencies at educational institutes and workplace, road and traffic accidents, disaster and multiple casualty accidents **Basic sex education**- Basics of Urinary and Reproductive System, Male puberty – Physical and emotional changes, male female similarities and differences, birth control, pregnancy, abortion and child birth, Sexual harassment, sexual abuse and rape, prevention of sexually transmitted diseases (STDs), Mental health and psychological first aid.	06 Hours
SUGGESTED READINGS: 1. Text book of medical laboratory technology, Praful Godkar; Bhalani Bhalani Publishing House 2. Manual of FIRST AID: Management of General injuries, Sports injuries and Common Ailments LC Gupta, Abhitabh Gupta Jaypee 3. Health Education and Community Pharmacy for First Year Diploma in Pharmacy 3Ed V.N. Raje, CBS 4. Textbook of Community Health Nursing I, S.D. Manivannan CBS Nursing	

ZOOLOGY (Hons.) Semester IV	**Minor Generic Elective Course (MNGEC)**
Course	**Aquatic Biology**
Subject prerequisite	**To study Science in class 12**
Credits Allotted	**4 Credits [60 hours]**
Teaching Scheme	3 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**

Learning Objectives

The learning objectives of the following course are:

- To overview of Aquatic systems.
- To enable students to understand the freshwater and marine biology.
- To learn the students about how to manage aquatic resources.

Learning Outcomes

By studying this course, students will be able to

- Learn about the importance of aquatic biomes, freshwater and marine bodies.
- To understand the management of aquatic resources.

Course content	**30 T + 60 P (Hours)**
UNIT 1: Aquatic Biomes Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.	6T +12P Hours
UNIT 2: Freshwater Biology I Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide).	6T +12P Hours
UNIT 3: Freshwater Biology II Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous. Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.	6T +12P Hours

UNIT 4: Marine Biology Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.	6T +12P Hours
UNIT 5: Management of Aquatic Resources Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.	6T +12P Hours
Practical's: • Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem. • Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body. • A Project Report on a visit to a Sewage treatment plant/Marine bio reserve/Fisheries Institutes.	
SUGGESTED READINGS: • Anathakrishnan : Bioresources Ecology 3 rd Edition • Goldman : Limnology, 2nd Edition • Odum and Barrett : Fundamentals of Ecology, 5th Edition • Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1st Edition • Wetzel : Limnology, 3rd edition • Trivedi and Goyal : Chemical and biological methods for water pollution studies • Welch : Limnology Vols. I-II	

ZOOLOGY (HONS.) Semester IV	**Skill Enhancement Courses (SEC)**
Course	**Medical Diagnostic Techniques**
Subject prerequisite	**To study zoology in undergraduate, a student must have passed in class 12**
Credits Allotted	**2 Credits [30 hours]**
Teaching Scheme	2 hours/week
Examination Scheme	Internal Assessment: 25 Marks **End of Semester: 75 Marks**
Course Objectives	1. The course would provide an insight to the learner about the diagnostic techniques. 2. It will help the student to understand how medical diagnostic techniques are important.
Course Outcomes	Upon completion of the course, students should be able to: 6. Acquire knowledge about how to perform different tests. 7. Understand the cause of important diseases and their tests to understand the patient condition. 8. Explain benefits and problems with health and related issues.

Course content	**Lectures (30 Hours)**
Unit I. Medical diagnostics Introduction to Medical Diagnostics and its Importance.	3 Hours
Unit II. Diagnostics Methods Used for Analysis of Blood Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.).	6 Hours
Unit III. Diagnostic Methods Used for Urine Analysis Urine Analysis: Physical characteristics; Abnormal constituents.	5 Hours
Unit IV. Non-infectious and infectious Diseases Non infectious diseases: Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit. Infectious Diseases: Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis.	10 Hours

Unit V. Tumours Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).	6 Hours

SUGGESTED READINGS:

1. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers.
2. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House.
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses.
4. Guyton A.C. and Hall J.E. Textbook of Medical Physiology, Saunders.
5. Robbins and Cortan, Pathologic Basis of Disease, VIII Edition, Saunders.
6. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

Activities

- Individual laboratory work and visit to hospital and pathology labs and submission of a hand-written Report not exceeding 10 pages in the given method or format.
- Training of students by related medical experts.