HSNC UNIVERSITY, MUMBAI
KISHINCHAND CHELLARAM COLLEGE

FYBSC ZOOLOGY SYLLABUS

As per NEP 2020
Academic Year 2024-25

Board of Studies in Faculties of Science & Technology
Board of Studies in ZOOLOGY Subject

1) Name of Chairperson/Co-Chairperson/Coordinator: -
    a. **Dr. Tejashree Shanbhag – Chairperson**

2) Two to five teachers each having minimum five years teaching experience amongst the full time teachers of the Departments, in the relevant subject.
    a. **Dr. Shalini Rai**
    b. **Dr. Aashu Vajpai**
    c. **Dr. Suvarna Sharma**

3) One Professor / Associate Professor from other Universities or professor / Associate Professor from colleges managed by Parent Body; nominated by Parent Body: -
    a. **Dr. Lata Sardesai**

4) Four external experts from Industry / Research / eminent scholar in the field relevant to the subject nominated by the Parent Body;
    a. **Dr. Sasikumar Menon -** Industry Expert
    b. **Dr. Kersi Avari -** Industry Expert
    c. **Dr. Manoj Borkar-** Research Scholar
    d. **Principal Dr. B.B. Sharma –** Academic Scholar
    e. **Principal Dr. Chhaya Panse-** Academic Scholar

5) Top rankers of the Final Year Graduate and Final Year Post Graduate examination of previous year of the concerned subject as invitee members for discussions on framing or revision of syllabus of that subject or group of subjects for one year.
    a. **Dr. Sudha Savant - Alumni**
    b. **Mr. Akshay Kawale – Alumni**

Part 1- Preamble

Zoology as a subject offers a basic understanding of the animal kingdom and their functioning of various physiological, metabolic, and biochemical aspects. This Course takes the students through the fascinating world of animals and their habitats, it explains the economic and ecological importance of the animals and the Conservation Strategies. The course includes Classical Zoology, Biodiversity, Biotechnology, Instrumentation, Ecology and Population Studies which enables the students to strengthen their knowledge in Animal Sciences and helps to develop and understanding of scope of the subject as an employment opportunity.

This Course has one Theory Paper and one Practical Paper in each of the Semesters. With the introduction of the Choice Based Grading System, there will be a continuous evaluation throughout the year in the form of Formative Assessment and Term End Assessment with a component of Open Book Examination.

Course Objectives:

ZOO101:

- Curiosity will be ignited in the minds of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology.
- Learners would appreciate the treasure of Biodiversity, its importance and hence would contribute their best for its conservation. Learners would be inspired to choose career options in the field of Wild life conservation, research, Photography and Ecotourism.
- Learners would understand recent advances in the subject and their applications for the betterment of mankind with the introduction of Biotechnology. It will help the budding mind to understand the novel approach of various techniques and tools, scope of the animal world to benefit the animal world and mankind.

ZOO102:

- Curiosity will be ignited in the mind of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology.
- Healthy dietary habits would be inculcated in the life style of learners in order to prevent risk of developing health hazards in younger generation due to faulty eating habits. Learners will be able to acquire knowledge of cause, symptoms and precautions of infectious diseases.

Vocational Course: (Related to Zoology):

- Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and economy in use of materials/chemicals during practical sessions.

- Study of Biostatistics will add understanding the importance of statistics in as a tool in biological problem analysis. The knowledge of culturing and maintenance of organism and maintenance of aquarium will provide a scope for self-employment and understanding of organism.

1. **Process adopted for curriculum designing:**
   The department conducted multiple meetings with the academic, Industry partners and established alumni. After discussion with them at different stages of syllabus development, the changes in the syllabus were introduced.

2. **Salient features, how it has been made more relevant:**
   After discussion and interaction with the industry and academic partners and understanding the requirement of the industries and other related fields certain changes in the syllabus are introduced. Certain portion of animal diversity were added to provide the physiological and other related study of various organisms in addition to their specialty in the animal world.

3. **Learning Outcome**
   First year B.Sc. course is the entry point for the students to undergraduate classes which acts like a guiding force for them to make up their mind in selecting a subject they would wish to pursue their studies in future for carving their career in a particular field. This curriculum will enable the following:

   - To nurture interest in the students for the subject of Zoology
   - To take the learner through a captivating journey of understating the diversity of Animal Kingdom and hoarded wealth of marvelous animal world (Invertebrates and Vertebrates).
   - To orient learners about rich heritage of Biodiversity of India and make them understand significance of its conservation.
   - To create awareness of the basic and modern concepts of Zoology
   - To orient students about the importance of abiotic and biotic factors of environment and their conservation.
   - To provide an insight to the basic nutritional and health aspects of human life.
   - To impart knowledge about source, quantum and need for conservation of fast depleting water resource and essentials of maintaining proper sanitation, hygiene and optimizing use of electronic gadgets.
   - To educate learners about causes, symptoms of disorders and infectious diseases.
   - To make learners understand the importance of balanced diet and essential nutrients of food at different stages of life.

Part 2- The Scheme of Teaching and Examination is as under:

Semester – I

Summary

Sr. No.	Choice Based Credit System			Subject Code	Remarks
1	Core Course (Zoology)			ZOO101B	NIL
2	Elective Course	Discipline Specific Elective (DSE) Course		-	
		2.1	Interdisciplinary Specific Elective (IDSE) Course	-	
		2.2	Dissertation/Project	-	
		2.3	Generic Elective (GE) Course	-	
3	Ability Enhancement Courses (AEC)			-	
	Skill Enhancement Courses (SEC)			-	

***One to two lectures to be taken for CONTINUOUS self -learning evaluation.**

Semester I and II Units – Topics – Teaching Hours

SEM	Subject Code	Subject Unit Title		Hours/ Lectures	Total No. of hours/lectures	Credit	Total Marks
I	ZOO101B	I	Diversity of Animal Kingdom-I	15	45 L	3	100 (60+40)
		II	Biodiversity and Conservation	15			
		III	Animal Biotechnology	15			
II	ZOO102B	I	Diversity of Animal Kingdom-II	15	45L	3	100 (60+40) Including Practical
		II	Wildlife Management	15			
		III	Health, Hygiene and Diseases	15			
I	ZOO101D	I	Practicals based on ZOO101B of theory	3	45x2= 90L lectures per batch	2	
II	ZOO102D	II	Practicals based on ZOO102D of theory	3		2	
			TOTAL			**8**	**100 per semester**

- **Lecture Duration – 60 Minutes Hours. (45 Lectures equivalent to 45 hours)**
- **One Credit =15 hours equivalent to 15 Hours**

Part -3 Detail Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

SEMESTER I

Subject Code – ZOO101B – TITLE: ANIMAL DIVERSITY AND ANIMAL BIOTECHNOLOGY		
Unit	Content	No. of Lectures
1	**Diversity of Animal Kingdom I** 1.1. Unicellular and multicellular organization (Salient features with examples of phylum and classes mentioned below) 1.1.1. Unicellular organization: Phylum Protozoa 1.1.2. Multicellular organization: Colonization level- Phylum Porifera 1.1.3. Multicellular organization: Division of labour (Cell differentiation)- Phylum, Coelenterata; Formation of Corals 1.2. Triploblastic acoelomate and Pseudocoelomate organization 1.2.1. Acoelomate organization - Phylum Platyhelminthes 1.2.2. Pseudocoelomate organization – Phylum Nemathelminths 1.3. Triploblastic coelomate organization 1.3.1. Animals with metameric segmentation- Phylum Annelida 1.3.2. Animals with jointed appendages- Phylum Arthropoda; Bioluminescence	**15**
2	**Biodiversity and Conservation** 2.1. Introduction to Biodiversity Definition, Concepts, Scope and Significance 2.2. Levels of Biodiversity - Introduction to Genetic, Species and Ecosystem Biodiversity 2.3. Introduction of Biodiversity Hotspots- (Western Ghats and Indo-Burma Border) 2.4. Values of biodiversity - Direct and Indirect use value 2.5. Threats to Biodiversity - Habitat loss 2.6. Biodiversity conservation and management 2.6.1. Conservation strategies: in situ, ex-situ, Sanctuaries, National parks, and Biosphere reserves. 2.6.2. Introduction to International efforts: Convention on Biological Diversity (CBD), International Union for Conservation of Nature and Natural Resources (IUCN), United Nations Environment Program - World Conservation Monitoring Centre (UNEP- CMC) 2.6.3. National Biodiversity Action Plan, 2002- 2003 2.6.4. Introduction to Indian Wildlife (Protection) Act, 1972 and Convention for International Trade of endangered species	**15**

3	**Animal Biotechnology** 3.1.Biotechnology: Scope and achievements of Biotechnology (Fishery, Animal Husbandry, Medical, Industrial) 3.2.Transgenesis: Retro viral method, Nuclear transplantation method, DNA microinjection method and Embryonic stem cell method 3.3.Cloning (Dolly) 3.4.Ethical issues of transgenic and cloned animals 3.5.Applications of Biotechnology: 3.5.1. DNA fingerprinting: Technique in brief and its application in forensic science (Crime Investigation) 3.5.2. Recombinant DNA in medicines (recombinant insulin) 3.5.3. Gene therapy: Ex-vivo and In vivo, Severe Combined Immunodeficiency (SCID), Cystic Fibrosis 3.5.4. Green genes: Green Fluorescent Protein (GFP) from Jelly fish- valuable as reporter genes used to detect food poisoning. 3.5.6: Food Biotechnology: Beer, Wine, Bread making	**15**

Self-Learning topics (Unit wise)

Unit	Topics
I	The students will identify one model organism in their vicinity or during a visit and do the detailed investigation on the same with respect to their classification and body organization. Also the students can identify the animal for its economic or environmental importance.
II	The students can identify the "Threats to Biodiversity - Habitat loss and Man-Wildlife conflict" in their surrounding areas and list them. They can consider the examples of Sanjay Gandhi National Park and Arrey Colony etc.
III	The students can identify the "Threats to Biodiversity - Habitat loss and Man-Wildlife conflict" in their surrounding areas and list them. They can consider the examples of Sanjay Gandhi National Park and Arrey Colony etc.

Online Resources

Swayam Portal:

Introduction of Biodiversity Hotspots- (Western Ghats and Indo- Burma Border)

Values of biodiversity - Direct and Indirect use value

Concept of Ecosystems: Ecosystem Definition and components

1. *epgp.inflibnet.ac.in, moocs online sourses Environmental Sciences, (530) Paper -03 Biodiversity and conservation, Module: 03, 04,05*
2. *epgp.inflibnet.ac.in, moocs online courses Environmental Sciences, (530) Paper -1 Ecosystem structure & amp. And functions, Module: 01,02,03 Ecosystem concept structure, structure and function*
3. *epgp.inflibnet.ac.in, moocs online courses Biotechnology (261) Paper -09 Animal Cell Biotechnology, Module: 10 Methods of creating Transgenic Animals*

SEMESTER II

Subject Code – ZOO102B TITLE: ANIMAL DIVERSITY AND WILDLIFE MANAGEMENT		
Unit	**Content**	**No. of Lectures**
1	**Diversity of Animal Kingdom** 1. Triploblastic coelomate organization: 1.1. Animals with mantle: Phylum Mollusca; Pearl Formation 1.2. Animals with enterocoel: Phylum Echinodermata, Phylum Hemichordata 1.3. Phylum Chordata 1.3.1. Subphylum Urochordata 1.3.2. Subphylum Cephalochordata 1.4. Subphylum Vertebrata 1.4.1. Superclass: Agnatha- Class Cyclostomata 1.4.2. Super class: Gnathostomata 1.4.2.1. Class Pisces (Cartilaginous and bony fish); Parental Care 1.4.2.2. Class Amphibia; Parental Care 1.4.2.3. Class Reptilia; Regeneration 1.4.2.4. Class Aves; Brood Parasitism 1.4.2.5. Class Mammalia; Parental Care	**15**
2	**Wild Life Management** 2.1.Concept of IUCN Red listed species using examples of Indian Wildlife with respect to National Parks and Wildlife 2.2. Sanctuaries of India (Sanjay Gandhi National Park, Tadoba Tiger Reserve, Corbett National Park, Kaziranga National Park, Gir National Park, Silent Valley, Pirotan Island Marine Park, Keoladev Ghana National Park, Bandipur Sanctuary, Khijadiya Bird Sanctuary at Jamnagar 2.3.Management strategies with special reference to Tiger and Rhinoceros 2.4.Ecotourism 2.5.Wildlife Trade and related crime; case studies	**15**
3	**Public Health, Hygiene and Common Diseases** 3.1.Health 3.1.1. Definition of Health, the need for health education and health goal. 3.1.2. Physical, psychological and Social health issues. 3.1.3. WHO and its programmes - Polio, Small pox, Malaria and Leprosy (concept, brief accounts and outcome with respect to India). 3.1.4. Common Human Diseases 3.2.Communicable and non-communicable diseases 3.2.1. Tuberculosis, Typhoid and Dengue 3.2.2. Hepatitis (A and B), AIDS, Gonorrhea and Syphilis 3.2.3. Diseases of respiratory system- Asthma, Bronchitis.	**15**

	3.2.4. Oral Cancer (Discuss cause/causative agents, symptoms, diagnostics, precaution /prevention and remedy) 3.2.5. Swine flu (cause, symptoms, precaution and remedy).	

Self-Learning topics (Unit wise)

Unit	Topics
I	The students will identify one model organism in their vicinity or during a visit and do the detailed investigation on the same with respect to their classification and body organization. Also the students can identify the animal for its economic or environmental importance.
II	Students can choose a Sanctuary or National Park of Asia other than India and comment on their biodiversity. The students can understand the requisite to declare a place as an Ecotourism spot.
III	The students should collect the information by conducting a preliminary survey to understand the Hygiene status of a population for communicable and non – communicable disease considering COVID 19 as an example and collate the data and prepare a report on it. The students will have to find out the role and directives of WHO during Epidemic and Pandemic in Country/World level.

Online Resources

Swayam portal

1. Moocs online Course (UG) Moocs online course UG: Diet Management in Health and disease

Part - 4: Detailed Scheme Practical

Paper-I Practical **Total Credit: 1**

Title of Paper: Diversity of Animal Kingdom-I, Biodiversity and its Conservation and Animal Biotechnology

Subject Code – ZOO101D			
Unit	**Content**	**No. of Lectures**	**Reference Books**
I, II, and III	1. Mounting of foraminiferan shells from sand (any 3) 2. Study of types of Corals - Brain, Organ pipe, Stag Horn, Mushroom coral 3. Study of Mounting of Septal Nephridia from Earthworm 4. Study of the following: 4.1. Symbiosis (Termite and Trychonympha, hermit crab and sea anemone) 4.2. Camouflage (leaf insect, chameleon) 4.3. Cannibalistic mate-eating animals (Spider and Praying Mantis) 4.4. Animal architects: Termites, Harvester ant and Baya weaver bird 4.5. Study of bioluminescent organisms – Noctiluca, glow worm, fire fly, angler fish. 5. Identification of transgenic fish (Trout and Salmon) / cloned animals (Dolly sheep, CC cat and Snuppy dog) from photograph. 6. Extraction of fruit juice with pectinase from apple/guava/or any other suitable fruit 7. Study the effect of Papain as meat tenderizer. 8. Application of DNA Fingerprinting in criminology (photograph of electrophoretic pattern to be given for interpretation by the students).	03 lectures per practical per batch	Practical Reference 1,2,3
*Note – The practical may be conducted by using specimens authorized by the wild such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended the UGC and as envisaged in the regulations of the relevant monitoring bodies. Specimen, however, shall be procured for the purpose of conducting practical here-in-above. there shall be at least one excursion/field trip			

Semester II Practical
Total Credit: 1
Title of Paper: Laboratory Safety, Units of Measurement, Instrumentation and Animal Biotechnology

Subject Code – ZOO102D			
Unit	**Content**	**No. of Lectures**	**Reference Books**
I, II, and III	1. Breeding and parental care in Amphibia- Rhacophorus, Midwife toad, Darwin's frog, Caecilian. 2. Mounting of scales of fish (placoid, cycloid and ctenoid) 3. Study of Adaptive radiation in Reptiles - Turtle, Tortoise, Phrynosoma, Draco) 4. Identification and differentiation of venomous and non-venomous snakes (Scales, Fangs, Bite marks, etc.) 5. Study of Types of feathers (contour, filoplume, down), beaks (Nectar feeding, Filter feeding), claws (perching, wading, swimming, hopping) in birds 8 a. Identification of birds - Coppersmith Barbet, Bulbul, Rose ringed Parakeet, Magpie Robin, two local birds. 6. Estimation of hardness from given water sample (tap water v/s well water) 7. Estimation of Free carbon dioxide (Free CO2) from two different samples- aerated drinks(diluted) v/s tap water 8. Study of Following: a. Study Biodiversity hotspots using world map (Western Ghats and Indo-Burma) b. Study of sanctuaries, national parks, biosphere reserves in India with respect to its brand fauna as listed in theory) 9. Qualitative estimation of Vitamin C by Iodometric method. 10. Estimation of maltose from brown/white bread. 11. Moisture content from biscuits or other suitable food products. 12. Milk adulterants (starch and glucose), methylene blue reduction Test (MBRT). 13. Screening of anaemic/non-anaemic persons using CuSO4 method. 14. BMI analysis - Measurement of Height/ Weight and calculation of BMI using formula, preparation and submission of report. 15. Field Report – To be done in a group of ten	03 lectures per practical per batch	Practical Reference 1,2,3

	students (submission of written / typed report preferably along with photographs/ tables/ graphs. Other Suggested topics for field observation/survey: Butterflies/ Fishes/ Migratory birds of local area. Variations in Human like Attached vs. Free Earlobes, Blood Groups, Eye colour, etc. using statistical method. 16. Observations of fauna in the field (with reference to theory syllabus).		

*Note –
The practical may be conducted by using specimens authorized by the wild such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended the UGC and as envisaged in the regulations of the relevant monitoring bodies. Specimen, however, shall be procured for the purpose of conducting practical here-in-above.

#There shall be at least one excursion/field trip

Swayam portal
Concept of balanced diet, dietary recommendations to a normal adult, infant, pregnant woman and aged.

1. *epgp.inflibnet.ac.in, moocs online courses Biotechnology (261) Paper -09 Animal Cell Biotechnology, Module: 10 Methods of creating Transgenic Animals*
2. *epgp.inflibnet.ac.in, moocs online courses Analytical chemistry/ instrumentation (221) Paper -03 Chromatography Techniques, Module : 01 & 02*

Reference Books (Sem I)

ZOO101B

1. InVertebrate Zoology, Volume I- Jordan and Verma, S. Chand and Co
2. Invertebrate Zoology- P. S.Dhami and J. K. Dhami , R.Chand and Co.
3. A Textbook of Zoology, Vol.II- T. Jeffery Parker and William. A. HaswellLow Price Publications
4. Ecology and Environment- P. D. Sharma, R. K. Rastogi Publications
5. Introduction to Ecology- R. Dajoz
6. Biodiversity- K.C.Agarwal- Agro Botanica Publications
7. epgp.inflibnet.ac.in, moocs online sourses Environmental Sciences, (530) Paper -03 Biodiversity and conservation, Module : 03, 04,05
8. Wildlife Laws and its Impact on Tribes- Mona Purohit , Deep and Deep Publication
9. epgp.inflibnet.ac.in, moocs online courses Environmental Sciences, (530) Paper -1 Ecosystem structure & amp. And functions, Module : 01,02,03 Ecosystem concept structure, structure and function
10. P.S. Verma and V. K. Agrawal, 2008. Cell biology, genetics, molecular biology, Evolution and Ecology. S. Chand Publications, New Delhi
11. Bioinstrumentation – L. Veerakumari, (M.J.P. Publishers)
12. Introduction to Practical Biochemistry – David T. Plummer (Tata McGraw Hill Publishing Co. Ltd.)
13. Principles and Techniques of Practical Biochemistry – Keith Wilson and John
14. Biotechnology by Jogdang
15. epgp.inflibnet.ac.in, moocs online courses Biotechnology (261) Paper -09 Animal Cell Biotechnology, Module: 10 Methods of creating Transgenic Animals
16. A Textbook of Biotechnology – R. C. Dubey, S. Chand Publication
17. Introduction to Practical Biochemistry – David
18. T. Plummer (Tata McGraw Hill Publishing Co. Ltd.)
19. Principles and Techniques of Practical Biochemistry – Keith Wilson and John
20. Biological instruments and methodology – Dr. P.K. Bajpai, S. Chand
21. epgp.inflibnet.ac.in, moocs online courses Analytical chemistry/ instrumentation (221) Paper -03 Chromatography Techniques, Module : 01 & 02

Practical

22. Invertebrate Practical Zoology- P.S.Verma and Agrawal
23. A Manual of Medical Laboratory Technology -A. H. Patel, Navneet Prakashan
24. Biological instruments and methodology – Dr. P. K. Bajpai, S. Chand Co. LTD

Reference Books (Sem II)

ZOO102B

1. Vertebrate Zoology Volume I- Jordan and Verma , S. Chand and Co
2. Chordate Zoology- P. S. Dhami and J. K. Dhami , R. Chand and Co.
3. Fundamentals of Ecology- E. P. Odum , Sunders Publication
4. epgp.inflibnet.ac.in Zoology (184) Paper 1: Principles of Ecology Module 8 a and b Life and fecundity table part 1 and 2
5. Essentials of Ecology and Environmental Science - S.V.S Rana
6. Field Biology and Ecology – Alen H. Benton and William E. Werner ,Tata McGraw Hill ltd, New Delhi
7. Ecology - Subramaniam and Others, Narosa Publishing House
8. Economic Zoology, Biostats and Animal Behaviour - Shukla, Mathur,
9. epgp.inflibnet.ac.in moocs online course UG: Diet Management in Health and disease (30)
10. Common Medical Symptoms edited - P. J. Mehta National Inblisents and Distributions
11. Nutrition: Principles and Application in Health Promotion - J. B. Lippincott
12. Moocs online course UG: Diet Management in Health and disease (30)
13. Human Physiology – Volume I – II C. C. Chatterjee, Medical Allied agenc Kolkata
14. Parasitology (Protozoology and Helminthoology) - K. D. Chatterjee

Practical

1. Economic Zoology, Biostats and Animal Behaviour - Shukla, Mathur, Upadhyay, Prasad. Rastogi Publications.
2. Ecology - Subramaniam and Others, Narosa Publishing House
3. A Treatise on Hygiene and Public Health. -B. N. Ghosh. Calcutta Scientific
4. Prevention of Food Adulteration, Act 1954. Asian Law House.
5. A Complete Handbook of Nature Cure - Dr. H.K. Bakru, Jaico Publishing House

Vocational Course in Zoology (Credits : 2)

Learning outcome:

- Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and economy in use of materials/chemicals during practical sessions.
- Students will be skilled to select and operate suitable instruments for the studies of different components of Zoology of this course and also of higher classes including research.
- Students will list out the precautions while performing any practical in the laboratory. The students will prepare the MSDS for the chemicals used in experiment will the use of safety symbols.
- The students will be working in the laboratory with various instruments throughout the academic year and will learn to use them efficiently by learning their SOPs.

VOC – ZOOLOGY –
Practical Based Learning
(0.66 Credits/ Semester = As 2 Credits shared in Three Subjects)
Total Credit: 0.66 = 5 Practical Sessions
ZOO103D - Semester I

Sr. No.	Content	No. of Practical sessions
1	**Laboratory safety and Units of Measurement:** 1.1: Introduction to good laboratory practices 1.2: Use of safety symbols: meaning, types of hazards and precautions: Units of measurement: i.: Calculations and related conversions of each: Metric system- length (meter to micrometer); Weight (gram to microgram); Volumetric (Cubic measures) ii.: Temperature: Celsius, Fahrenheit, Kelvin iii.: Concentrations: Percent solutions, ppt, ppm, ppb dilutions, Normality, Molarity and Molality	03
2	**Biostatistics:** Introduction and scope, Sampling and its types, Central Tendencies -Mean, Median, Mode Tabulation, Graphical representations (Histograms, bar diagrams, pie diagrams).	02

ZOO104D - Semester II

Sr.No.	Content	No. of Practical sessions
1	**Microscopy:** a. Construction, Principle and Applications of: i. Dissecting and Compound microscope, ii. Scanning Electron Microscopy, iii. Transmission Electron Microscopy. b. Study of parts of microscope and their functions. c. Technique of focusing a permanent slide under 10x and 45x (objectives).	**02**
2	a. Preparation and maintenance of Paramecium/Daphnia culture (group activity) b. Setting up an Aquarium and maintenance (group activity)	**03**

Swayam Portal: epgp.inflibnet.ac.in, moocs online courses Analytical chemistry/ instrumentation (221) Paper -03 Chromatography Techniques, Module : 01 & 02