

K.L.E Society's
Raja Lakhamagouda Institute (Autonomous).Belagavi
DEPARTMENT OF ZOOLOGY
V semester CBCS 2022-23

ZOO511-DSE- Cell Biology, Biotechnology, Biostatistics and Research Methodology

04-Credits-60

UNIT-1

15 Hours

Cell Biology: Ultra structure of animal cell, Cell theory & cell cycle, Fluid Mosaic Model
Ultra-Structure & function of cell organelles: Plasma membrane, Endoplasmic reticulum, Ribosome's. Golgi-complex. Lysosomes, Mitochondria Nucleus and Cytoskeletons.
Chromosomes: Structure and types of chromosomes Ultra-structure of chromosome. Nucleosomes, polytene and lampbrush chromosomes.

Cell division: Types and significance: mitosis and meiosis

Cellular aging and cell death: Concept of aging theories, effect of aging on cell organelles. Apoptosis, Senescence, Necrosis: Definition and significance

Cancer Biology: Introduction, Types of cancers. Characteristics of cancer cells. Carcinogens, cause & Prevention.

UNIT-2

15 Hours

Biotechnology: Introduction: Sub-fields of biotechnology history of Biotechnology Scenario in India

Types of Biotechnology: Animal Biotechnology. Plant Biotechnology Microbial Biotechnology. Environmental Biotechnology Medical Biotechnology

Molecular biotechnology: Genetic engineering/Recombinant DNA Technology

- a. Molecular tools: Restriction enzymes, DNA ligase. Alkaline phosphatase.
- b. Vectors: Plasmids. Bacteriophages, Cosmids.
- c. Host cells: Prokaryotic hosts and Eukaryotic hosts.
- d. Bioreactors: Definition, types (mention) and applications.
- e. Methods of gene transfer: Microinjections, Electroporation of DNA.

Lipofection and direct transfer of DNA

Applications of Biotechnology:

- a. **Transgenesis:** Introduction- Meaning and significance.
Transgenesis in mice, knock out and knock in technology.
- b. **Animal improvement:** Super ovulation and embryo transfer: steps. benefits and limitations of embryo transfer. Artificial insemination, Intracytoplasmic sperm injection.
- c. **Gene therapy:** Somatic cell gene therapy. Embryo cell gene therapy and germ cell gene therapy. In vivo and ex-vivo gene therapy.

- d. **Stem cells:** Introduction, features, types, sources and Applications.
- e. **Hybridoma technology:** Monoclonal antibodies and their applications.
- f. **DNA fingerprinting:** Definition, steps involved and applications

UNIT-3

15 hours

Biostatistics: Fundamentals of Biostatistics, Preliminary concepts, Frequency Distribution. Graphical presentation of data: Bar diagram, Histogram. Measures Of Central Tendency- Mean, Median and Mode. Measures of variation. Probability, Chi-square test.

UNIT-4

15 Hours

Research Methodology

Introduction: Sample methods of sampling (Random and Non Random Sampling). Advantages of sampling. types of Data, Sources of Data and Analysis.

Types of Research: Analytical vs Descriptive. Quantitative vs Qualitative. Basic vs Applied.

Research design: Need for research design: Features of good design. Important concepts related to good design- Observation and Facts. Prediction and Explanation. Developing a research plan: Problem identification. Experimentation. Determining experimental designs.

Conclusion: Research ethics and Report writing.

COURSE OUTCOMES

After Successful Completion of the course students will gain knowledge of:

CO1: Gives an understanding of the basic unit of life. Cell and the various organelles, Cell division nuclear material and about Cancer

CO2: It provides students the knowledge of how living organisms can be manipulated and cultured by applying various techniques for human welfare

CO3: The ability to interpret and analyze the data pertaining to biology and is also useful in preparing for competitive exams

CO4: Helps students to develop interest in research field. It also gives them an idea about collecting data for research work, analyze it and draw a conclusion to write the final report.

V Semester- PRACTICAL -1

Credits: 02

- 1) Study of permanent cytology slides of Mitosis & Meiosis
- 2) Study of temporary preparation of Mitotic stages from onion root tip cells
- 3) Study of temporary preparation of Meiotic stages from onion flower bud/Grasshopper testis.
- 4) Chromosomes types: Polythene chromosome and Lampbrush chromosome.
- 5) Study of Paper Chromatography.
- 6) To form frequency distribution table & draw histogram, frequency polygon & frequency curve
- 7) Measurement of central tendency (mean, median and mode).
- 8) Isolation of DNA/RNA.
- 9) Make a data collection of any fauna found nearby the campus, prepare a mini dissertation report.

V Semester- PRACTICAL -2

Credits: 02

1. Study of different non mulberry silk worms and life cycle of mulberry silk moth (*Bombyx mori*).
2. Castes system in Honey bees.
3. Study of commercially important fishes. Crustaceans and Molluscs.
4. Study of different species of earthworm.
5. Study of Poultry breeds.
6. Study of Dairy breeds.
7. Identification of agricultural pests such as Cotton grey, Weevil pest. Cabbage Sugarcane mealy beg. Potato tuber moth, Brinjal stem borer. Mango stem bor caterpillar
8. Visit to poultry farm or animal breeding center. Submission of visit report.

REFERNCES

1. Julio Celis Nigel Carter Kai Simons J. Small Tony Hunter David Shotton, Cell Biology (3 edition). Academic Press
2. Verma P.S. (Author), Agarwal (2004): Cell Biology, Genetics, Molecular Biology. Evolution & Ecology. S Chand publisher
3. N Arumugam (2014): Cell Biology & Molecular Biology. Saras publications
4. Brown, T.A. (1998). Molecular Biology Labfax II: Gene Cloning and DNA Analysis. IIEdition. Academic Press, California, U.S.A.

5. Glick, B.R. and Pasternak, J.J. (2009), Molecular Biotechnology - Principles and Applications of Recombinant DNA. IV Edition, ASM press. Washington, USA,
6. Griffiths. A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart. W.M. (2009) An introduction to Genetic Analysis, IX Edition. Freeman and Co.. N.Y.. USA.
7. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc..
8. Watson, J.D., Myers, R.M., Caudy. A. and Witkowski, J.K. (2007). Recombinant DNA Genes and Genomes- A Short Course. III Edition, Freeman and Co. NY... USA
9. BK Mahajan: Methods in Biostatistics for Research Workers
10. K Visweswara Rao: Biostatistics a Manual of Statistical Methods for Use in Health Nutrition and Anthropology
11. Anthony, M. Graziano, A.M. and Raulin, M.L. 2009. Research Methods: A Process Inquiry, Allyn and Bacon.
12. Walliman, N. 2011. Research Methods- The Basics. Taylor and Francis. London. New York.
13. Wadhwa, B.L.: Law Relating to Patents. Trade Marks. Copyright Designs and Geographical Indications, 2002, Universal Law publishing.
14. C.R. Kothari: Research Methodology, New Age International, 2009.
15. Coley, S.M. and Scheinberg. C.A. 1990, -Proposal writing. Stage Publications.

COURSE OUTCOMES:

- CO1: Observation of specimens and models helps them to understand the theory aspects in a much better way
- CO2: Students develop skills of preparing slides
- CO3: Their visit to various Industries and instrumentation centers gives them a better understanding of the working
- CO4: The ability to interpret and analyze the data pertaining to biology and is also useful in preparing for competitive exams
- CO5: Gives the students knowledge of how various animals can be cultured in bulk so that the animals themselves and their by-products can give the culturist a source of income

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DEPARTMENT OF ZOOLOGY
CBCS Syllabus 2022-23
V semester Skill Enhancement Course (SEC)
200521-Medical Diagnostics

02Credits-30 hours

Marks: Th-40-1A-10

UNIT-1

15 Hours

Introduction to Medical Diagnostics and its Importance **Diagnostic 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)

Diagnostic Methods Used for Urine Analysis: Urine Analysis: Physical characteristics:Normal and abnormal constituents

UNIT-2

15 Hours

Non-infectious Diseases: Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type 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

Tumours: Types (Benign Malignant). Detection and metastasis: Medical imaging: X Ray Principle and its applications. PET, MRI and CT Scan (using photographs).

Syndrome: AIDS-causes, symptoms, prevention, Hepatitis-B- causes, symptoms, prevention.

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, 11. 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.

COURSE OUTCOMES:

CO1:

- Provides the knowledge of various instruments used in routine lab procedures and their working principles
- Gives brief knowledge of basic understanding of hematology care testing in all areas of the laboratory
- Provides the knowledge of analysis of the excretory products

CO2:

- It provides the knowledge about how to distinguish between infectious and non infectious diseases
- The students gain the knowledge about infectious agents and their modes of transmission and the diseases they cause

K.L.E Society's
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DEPARTMENT OF ZOOLOGY
VI semester CBCS 2022-23

DSE-1 Ecology, Zoogeography and Wildlife Conservation.

04 Credits-60hours

UNIT- 1

15Hours

Ecology: (Part-A)

Earth as living planet, sub divisions of ecology, scope of ecology, biosphere

Abiotic factors:

Light: Intensity of light. Effect of light on metabolism, Effect of light on color and structure
Effect of light on locomotion and orientation, Effect of light on terrestrial and aquatic organisms.

Temperature: Thermal stratification, Effect of temperature on metabolism. Effect of temperature on growth and development, Effect of temperature on reproduction and other effects.

Soil: Soil as habitat for organisms, soil profile, types of soil. Adaptations of organisms.

Factor: Mutualism, commensalism, amensalism. parasitism. predation. Competition parasitism and Proto- cooperation.

Biogeochemical cycles: Principles and concepts of water, nitrogen, carbon.oxygen cycles
.Sulphur cycle and Phosphorus cycle.

Community ecology: Community structure, ecological niches, edge effect. stratification, ecotone and Ecological succession.

UNIT-2

Ecology: (Part-B)

15 Hours

Habitats: Characteristics, effect on animals and its adaptations.

Marine habitat- Zonation of sea and Ecological classification of marine habitat.

Fresh water habitat- Types of fresh water habitat, Lake Zonation. Stratification, Lake eutrophication.

Terrestrial habitat, detailed account of biomes- Examples of major biomes. Population ecology: Density, natality, mortality, age distribution, population growth. types of curves, Alleles and Gauge principle.

UNIT-3

15 Hours

Zoogeography: Zoogeographical realms of world, a brief account of Wallace's line. means of dispersal, factors affecting the dispersal of animals, continental drift theory. types of distribution of animals, island life, insular fauna, new world marsupials

UNIT- 4

15 hours

Wildlife and its Conservation: Wildlife conservation methods, Wildlife in India. Causes for the depletion of wildlife, Wildlife conservation techniques.

- **In-situ conservation:** Wild life sanctuaries. National parks and Biosphere reserves.
- **Ex-situ conservation:** Zoological gardens, Botanical gardens, seed bank
- **Brief account of:** IUCN.WWF, Bombay Natural History Society. Indian Board for Wildlife, Red Data Book.

Wild Life Act 1972 and its amendments in India, CITES, Project Tiger and Biosphere reserve Hot spots, Endangered, Threatened, Vulnerable and Extinct species. Fauna of India.

COURSE OUTCOMES:

After Successful Completion of the course students will gain knowledge of:

CO1: It helps the students to understand the importance of natural resources and its conservation

CO2: It provides the students to understand the importance and conservation of natural habitats which is essential for the wildlife conservation

CO3: It gives them a brief idea about the six major realms of the world based on the flora ,fauna and the climatic conditions

CO4: It helps students to acquire knowledge about the rich biodiversity on the planet and biodiversity hotspots in India ,it also creates an awareness about wildlife depletion and various government and non-government organizations which thrive to conserve them

VI Semester- PRACTICAL-1

Credits: 02

1. Study of threatened animals of India (Tiger, Lion, Single horned Rhinoceros, Musk deer, Gaur, Golden Langur, Lion tailed monkey)
2. Estimation of CO₂ and Hardness of water from different water samples.
3. Estimation of dissolved oxygen from different water samples.
4. Study of Ecological Adaptations and Morphological peculiarities: Examples! Hermit crab, Draco, Stick insect, Puffer fish, Exocoetus, Phrynosoma, Chameleon and Bat.
5. Study of zoogeographical realms on world map.
6. Marking of existing Project tiger areas and Biosphere reserves in Indian map
7. Spotting of the endangered animals conserved in protected areas of Karnataka state (Using Karnataka map), Marking of National parks in Karnataka map. Marking of Wildlife sanctuaries in Karnataka map.
8. Visit to nearby locality or forest to study the ecosystem & Study report.

VI Semester- PRACTICAL - 2

Credits: 02

1. Types of nest of birds
2. Social Organization in Termites
3. Social organisation in Honey bee
4. Parental care in fishes and amphibians
5. Demonstration of Drosophila Behaviour: Response of Drosophila flies to different culture media. (Ripe Banana, Rava, Curd)
6. Mimicry Camouflage: Stick Insect, Leaf Insect, Coral Snake, Monarch and Chameleon
7. Study of arboreal adaptations Chameleon, Loris, Sloth, Rhacophores
8. Study of Volant adaptations- Dragon fly, Pigeon, Bat, Exocoetes and Draco.

REFERENCES

- Odum E P- Ecology- Amerind Publications, New Delhi.
Singh H.R. (2006)- Ecology and Environmental Sciences Vishal Jullandar
N Arumugam, Ecology- Agusteewaram, Kanyakumari
Mishra D D. (2008)- Environmental Studies- S.Chand.Co. New Delhi

COURSE OUTCOMES:

CO1: Students get an opportunity to study the biodiversity in the best way by study visits to Sanctuaries and National parks

CO2: They learn to locate important biodiversity hotspots on maps which enables them to understand the distribution of animals around the world and in India

CO3: The students learn about estimation of different water samples

CO4: It helps students to understand the contributions of Noble laureates pertaining to animal behaviour. It also gives knowledge about various kinds of behaviour which animals exhibit, social organization in various groups of animals and different means by which animals communicate

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DEPARTMENT OF ZOOLOGY
CBCS Syllabus 2022-23
VI semester Skill Enhancement Course (SEC)
ZOO621-Sericulture

02 Credits-30 hours

Marks: Th 40-1A 10

UNIT-1

15 Hours

Introduction: Sericulture: Introduction and present status, Types of silkworms. Distribution and Races, Mulberry and non-mulberry Sericulture

Biology of Silkworm: Life cycle of Bombyx mori. Structure of silk gland and secretion of silk

Rearing of Silkworms and reeling of silk: Part-A Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances. Disinfectants: Formalin, bleaching powder

UNIT 2

15 Hours

Rearing of Silkworms and reeling of silk: Part- B: Silkworm rearing technology: Early age and Late age rearing Types of mountages, Spinning, harvesting and storage of cocoons. Silkworm reeling techniques

Pests and Diseases: Pests of silkworm: Uzi fly and dermestid beetles. Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial. Control and prevention of pests and diseases

Entrepreneurship in Sericulture: Prospectus of Sericulture in India: Sericulture industry indifferent states, employment opportunities. Visit to various sericulture centres.

REFERENCES

1. Handbook of Practical Sericulture: S.R. Ullal and M.N. Narasimhanna CSB. Bangalore
2. Appropriate Sericultural Techniques; Ed. M. S. Jolly, Director, CSR & TI. Mysore.

3. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1. Fuzi Pub. Co. Ltd... Tokyo, Japan
4. Manual of Silkworm Egg Production: M. N. Narasimhanna, CSB. Bangalore
5. Silkworm Rearing: Wupang Chun and Chen Da-Chung. Pub. By FAO, Rome
6. A Guide for Bivoltine Sericulture; K. Sengupta. Director, CSR & TI. Mysore
7. Improved Method of Rearing Young age silkworm; S. Krishnaswamy, reprinted CSB. Bangalore.

COURSE OUTCOMES:

CO1:

- Provides the knowledge of various types of Silkworms
- Students acquire knowledge and develop skill in silkworm rearing and support silkworm farming
- Students gain skill with hands on training on mulberry cultivation

CO2:

- Students develop the skill in reeling of silk
- Provides ability in developing entrepreneurial skills