

**K.L.E Society's  
Raja Lakhamagouda Science Institute (Autonomous), Belagavi**

**(PO's/PSO's/CO's)**

**Program: B. Sc. Zoology & Biotechnology (UG01C14)**

**Programme Outcome**

- PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in Botany & Biotechnology and its different subfields.
- PO2: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the four basic areas of Botany & Biotechnology.
- PO3: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of Botany & Biotechnology, and planning, executing and reporting the results of an experiment or investigation.
- PO4: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

**Programme Specific Outcomes**

- PSO1: Students will realize and develop an understanding of the impact Botany & Biotechnology on society and apply conceptual understanding of the Botany & Biotechnology in real life.
- PSO2: Perform effectively with professional ethics in analytical, scientific and technical domains.
- PSO3: Demonstrate subject-related and transferable skills that are relevant to Botany & Biotechnology related job trades and employment opportunities.

## Course Outcomes

### Semester I

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN101	Generic English-I	<b>CO1:</b> Learn to appreciate literary texts. <b>CO2:</b> Obtain the knowledge of literary devices and genres. <b>CO3:</b> Acquire the skills of creativity to express one's experiences. <b>CO4:</b> Be aware of their social responsibilities. <b>CO5:</b> Develop the critical thinking skills.
AECC	21KA101	Kannada	<b>CO1:</b> Create appreciation for Kannada language and culture through Kannada literature <b>CO2:</b> Creating environmental awareness. <b>CO3:</b> Developing scientific perspective through science literature. <b>CO4:</b> Know the importance and various forms of Kannada Language
AECC	21HI101	Hindi	<b>CO1:</b> Create interest among the students by reading story. <b>CO2:</b> Will be familiar with the development sequence of modern Hindi story. <b>CO3:</b> Interest towards linguistic correctness will be created. <b>CO4:</b> Will be able to acquire writing skills. <b>CO5:</b> Know the importance and various forms of Hindi Language.
SEC	21CS111	Digital fluency	<b>CO1:</b> Have an intelligent conversation on the key concepts and applications of artificial intelligence (AI), Big data analytics (BDA), internet of things (IOT), Cloud computing, and cyber security. <b>CO2:</b> Develop holistically by learning essential skills such as effective communication, problem solving, design thinking, and team work. <b>CO3:</b> Build his or her personal brand has an agile and expensive learner-one who is interested in horizontal and vertical growth?

DSC	21Z0101	<b>Cytology, Genetics and Infectious Diseases</b>	<p><b>CO1:</b> Students are able to understand the basic unit of life.</p> <p><b>CO2:</b> Ability to understand the structure and functions of Nucleus, types of DNA, RNA, ultrastructure of chromosome and importance of cell division.</p> <p><b>CO3:</b> To impart the knowledge to understand the various principles of Inheritance.</p> <p><b>CO4:</b> Students are able to gain knowledge of sex-linked inheritance, chromosomal structural and numerical aberrations and also understand various parasites that affect human beings, their life cycle, treatment and preventive measures.</p>
OEC	21Z0111	<b>ECONOMIC ZOOLOGY</b>	<p><b>CO1:</b> Students gain the knowledge of various parasites that affect human beings, their life cycle, treatment and preventive measures.</p> <p><b>CO2:</b> Provides knowledge about parasitic Nematodes, Arthropods and Vertebrates and their life cycle, pathogenicity and control measures.</p> <p><b>CO3:</b> Imparts the knowledge about fundamental techniques used in molecular diagnosis.</p>
DSC	21Z0102	<b>Cytology, Genetics and Infectious Diseases</b>	<p><b>CO1:</b> Students gain knowledge of Sericulture and Apiculture and are able to apply their skill and take up entrepreneurship.</p> <p><b>CO2:</b> To gain the knowledge of Dairy, Poultry and Aquaculture and are able to apply their talent and acquire the ability of entrepreneurship</p> <p><b>CO3:</b> Students develop skill in Fish culture, Prawn culture, Vermiculture and Lac culture techniques.</p>
DSC	21BT101	<b>Cell Biology and Genetics</b>	<p><b>CO1:</b> Develop the knowledge of how the cell is considered to be the structural and functional unit of life by learning in detail about the structure and the functions of different cell organelles.</p> <p><b>CO2:</b> Understanding the cell division in which is an important aspect of growth and development.</p>

			<p><b>CO3:</b> To communicate the role of Mendelian concepts in the development of the Science and Genetics, and learning about different laws in Genetics, Gene interactions, inheritance and various important aspects.</p> <p><b>CO4:</b> Students will get the knowledge of molecular basis of variability, inheritance, Chromosomal evolutionary aspects, Human genetics and genetic disorders in human.</p>
DSC	21BT102	<b>Cell Biology and Genetics</b>	<p><b>CO1:</b> Students will learn about handling and Standard Operating Procedures of different instruments being used in biotechnology laboratory</p> <p><b>CO2:</b> The students will acquire knowledge of composition and preparation of different stains and reagents being used to observe the structure and components of the cell.</p> <p><b>CO3:</b> The students will understand the concept of study of divisional stages of cell division including mitosis and meiosis. They will observe the stages of division and can easily differentiate them.</p> <p><b>CO4:</b> Genetics is the study of inheritance. In the practical of genetics the students will learn about the mounting of polythene chromosomes, karyotyping to analyze different diseases in human being and the will learn about solving some of the problems associated with Genetic studies.</p>

## Semester II

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN201	Generic English-II	<p><b>CO1:</b> Learn to appreciate literary texts.</p> <p><b>CO2:</b> Obtain the knowledge of literary devices and genres.</p> <p><b>CO3:</b> Acquire the skills of creativity to express one's experiences.</p> <p><b>CO4:</b> Be aware of their social responsibilities.</p>

AECC	21BO311	Environmental Studies	<p><b>CO1:</b> define environmental study and ecology with basic principles.</p> <p><b>CO2:</b> To examine the natural resources their types and utility.</p> <p><b>CO3:</b> To identify the environmental usages, types of pollutions and their impact.</p> <p><b>CO4:</b> To outline the diversity and explain the conservations and its significance.</p>
AECC	21KA201	Kannada-II	<p><b>CO 1:</b> A good personality is formed by literature based on life values.</p> <p><b>CO 2:</b> Students become ambitious to build a better life by achieving specific goals.</p> <p><b>CO 3:</b> Inspiring to always be enthusiastic in life.</p> <p><b>CO 4:</b> You will get complete knowledge of modern Kannada poetry.</p>
AECC	21HI201	Hindi-II	<p><b>CO1:</b> Create interest among the students by reading story.</p> <p><b>CO2:</b> Will be familiar with the development sequence of modern Hindi story.</p> <p><b>CO3:</b> Interest towards linguistic correctness will be created.</p> <p><b>CO4:</b> Will be able to acquire writing skills.</p> <p><b>CO5:</b> Know the importance and various forms of Hindi Language.</p>
DSC	21ZO201	Biochemistry and Physiology	<p><b>CO1:</b> Students are able to gain knowledge of the various biomolecules and their importance to understand the biochemical reactions in human body.</p> <p><b>CO2:</b> Helps students to understand the metabolic pathways in human body.</p> <p><b>CO3:</b> Students acquire knowledge of the process of digestion and respiration in man.</p> <p><b>CO4:</b> Students gain knowledge about the function of nervous system and understand the major controlling, regulatory and communication system along with endocrine system and muscle contraction.</p>
OEC	21ZO211	PARASITOLOGY	<p><b>CO1:</b> Students gain the knowledge of various parasites that affect human beings, their life cycle, treatment and preventive measures.</p> <p><b>CO2:</b> Provides knowledge about parasitic Nematodes, Arthropods and Vertebrates and their life cycle, pathogenicity and control measures.</p> <p><b>CO3:</b> Imparts the knowledge about fundamental techniques used in molecular diagnosis.</p>

DSC	21ZO202	Biochemistry and Physiology	<p><b>CO1:</b> Students gain the knowledge of various parasites that affect human beings, their life cycle, treatment and preventive measures.</p> <p><b>CO2:</b> Provides knowledge about parasitic Nematodes, Arthropods and Vertebrates and their life cycle, pathogenicity and control measures.</p> <p><b>CO3:</b> Imparts the knowledge about fundamental techniques used in molecular diagnosis.</p>
DSC	21BT201	Microbiological Methods	<p><b>CO1:</b> Instruments considered to be the important part of Practicals. The students will learn about the principles and standard operating procedures of different instruments being used in the field of Life Science for research and development</p> <p><b>CO2:</b> Students will understand the importance of aseptic condition for the laboratory work in Biotechnology. They get the knowledge of sterilization and the microbial techniques.</p> <p><b>CO3:</b> Microorganisms - The structure, diseases caused by these microbes will be learnt</p> <p><b>CO4:</b> The action of antimicrobial agents with example is well understood.</p>
DSC	21BT202	Microbiological Methods	<p><b>CO1:</b> Students will learn about handling and Standard Operating Procedures of different instruments being used in Microbiology laboratory.</p> <p><b>CO2:</b> The students will acquire knowledge method and importance of Sterilization, preparation of media for the growth of microorganisms in the laboratory.</p> <p><b>CO3:</b> The students will understand the inoculation techniques using different pure culture methods and the understand about the colony characterization of bacterial and fungal colonies.</p> <p><b>CO4:</b> Students will acquire the knowledge of staining techniques to observe the microbes and biochemical analysis to understand the character of the microorganism.</p>

## Semester III

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN301	Generic English-III	<p>CO1: Acquired enhanced LSRW (Listening, Speaking, Reading, Writing) skills</p> <p>CO2: Equipped themselves with interpersonal communication skills</p> <p>CO3: Augmented presentation and analytical skills</p> <p>CO4: Ability to critically analyses, interpret and appreciate literary texts</p> <p>CO5: An awareness of social, cultural, religious and ethnic diversities</p>
AECC	21KA301	Kannada-III	<p>CO 1: By knowing about Bhakti Sahitya, you will have the quality of humanity.</p> <p>CO 2: Through travel literature, people will learn about the life and culture of different regions</p> <p>CO 3: The study of ideological literature will lead to revolution.</p> <p>CO 4: Know the importance and various forms of Kannada Language.</p>
AECC	21HI301	Hindi-III	<p>CO1: Able to understand One Act plays</p> <p>CO2: Learn to write various types of Letters</p>
SEC-2		<b>Constitution of India</b>	<p>CO1: To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.</p> <p>CO2: To identify the importance of fundamental rights as well as fundamental duties.</p> <p>CO3: To understand the functioning of Union, State &amp; Local Govt. in Indian federal system.</p>
DSC	21ZO301	Molecular Biology, Bioinstrumentation in Biology	<p>CO 1: Gives an understanding of process of making an RNA copy of a gene's DNA sequence.</p> <p>CO 2: Through travel literature, people will learn about the life and culture of different regions</p> <p>CO 3: The study of ideological literature will lead to revolution.</p>

OEC	21ZO311	ENDOCRINOLOGY	<p>CO1: Students will be able to classify hormones</p> <p>CO2: It gives knowledge about mode of action and chemical structures of hormones</p> <p>CO3: Students will be able to learn Gastro-intestinal hormones and their role in digestion</p>
DSC	21ZO302	Practicals	<p>CO1: It gives extensive knowledge about the use of laboratory equipments and sterilization techniques.</p> <p>CO2: Gives general understanding of DNA handling techniques and isolation of genetic material.</p> <p>CO3: It imparts knowledge about centrifugation techniques in separating components of given mixture.</p>
DSC	21BT301	Biotechnology-III	<p>CO 1. Students will understand the different types of Carbohydrates, their detailed structure and properties and also understand about Metabolism of various biological pathways</p> <p>CO 2. Students are able to understand the different biological functions and Classification of Lipids, Enzyme Kinetics and types of enzyme Inhibition</p> <p>CO 3. Students will get to know about the biological role of Vitamins and their deficiency diseases, and also types, structure of Nucleic Acids that is of DNA and RNA, here students also understand the chemical Nature and Structure of different Hormones.</p> <p>CO 4. The applications and techniques of different Bio analytical tools will be understood.</p>
DSC	21BT302	Practical's-III	<p>CO1: Students will understand Definitions and calculation of Molarity, Molality, Normality, Mass percent % (w/w), Percent by volume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions.</p> <p>CO2: Standard solutions, stock solution, solution of acids - Preparation of standard buffers– Acetate, phosphate, Tris and determination of pH of solution using pH meter.</p> <p>CO3: Qualitative analysis of Carbohydrates, Proteins, Estimation of maltose by DNS method and proteins by Bradford method and amino acid by Ninhydrin method. Students will also understand Determination of <math>\alpha</math>-amylase activity by DNS method and iodine number of lipids.</p>



## Semester IV

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN401	Generic English-IV	<p>CO1: Acquired creative, interpretative and critical thinking</p> <p>CO2: Skills to communicate confidently and effectively</p> <p>CO3: Obtained persuasive and creative social media writing skills</p> <p>CO4: Developed analytical and evaluative skills</p> <p>CO5: Learnt to identify and understand social contexts and ethical frameworks in the texts</p>
AECC	21KA401	Kannada-IV	<p>CO 1: Learn to live in harmony by learning about the oppressed race.</p> <p>CO 2: students will live in tolerance with each other.</p> <p>CO 3: By understanding the life of common people, one will know the essence of simple life</p> <p>CO 4: Know the importance and various forms of Kannada Language</p>
AECC	21HI401	Hindi-III	<p>CO1: Able to understand Hindi Novels</p> <p>CO2: Able to understand the importance of Mass Media and Communication</p>
SEC-2		<b>Artificial Intelligence</b>	<p>CO1: To get introduced about the concept of artificial intelligence and machine learning.</p> <p>CO2: Understanding data analysis process i.e. preparation, modelling, visualization.</p> <p>CO3: It is to learn about the robotics, types of robots and also components of robots.</p>
DSC	21ZO401	Gene Technology, Immunology and Computational Biology	<p>CO1: Gives an understanding of the use of rDNA technology in cloning of commercially important plants and animals.</p> <p>CO2: Gives an understanding of how different lymphocytes interact together to coordinate against disease causing foreign bodies.</p> <p>CO3: It gives understanding of how transplantation is carried out in animals and difficulties faced in transplantation.</p>
OEC	21ZO411	Animal behaviour	<p>CO1: Animal behaviour helps students to learn how animals interact with each other and their surrounding environment</p>

			<p><b>CO2:</b> Students develop the skill of observation, which helps them to learn lessons from animals</p> <p><b>CO3:</b> Helps the students to understand biological clocks and biological rhythms in animals</p>
DSC	21ZO402	Practicals	<p><b>CO1:</b> Helps students to understand common techniques used in biological sciences such as PAGE, Agarose gel electrophoresis, and determination of blood groups.</p> <p><b>CO2:</b> Students will be able to learn handling nucleotide sequence databases.</p> <p><b>CO3:</b> Helps students to quantify DNA and protein fragments.</p>
DSC	21BT401	Biotechnology-IV	<p><b>CO 1.</b> Students will understand the Molecular structure of genes, Genetic Code and its properties also different experiments to proof DNA and RNA as Genetic material.</p> <p><b>CO 2.</b> Different proteins involved in the DNA replication process and the DNA damage and repair mechanism, also understand by this unit.</p> <p><b>CO 3.</b> Students can understand the Mechanism of Transcription, Translation Process and different factors involved in the mechanism.</p> <p><b>CO 4.</b> The process of Operon concept, gene mapping, and Gene regulation Process will understand.</p>
DSC	21BT302	Practical's-IV	<p><b>CO1:</b> Students will understand DNA model making, Estimation of DNA, RNA and Protein by DPA, Orcinol, and FCR method respectively.</p> <p><b>CO2:</b> Students will gain knowledge about Quantification of DNA/Protein by spectroscopic method and Estimation of protein by FCR method, students will also understand Extraction and partial purification of protein from plant source by Ammonium sulphate precipitation.</p>