Sophia College (Autonomous)

Life Science

FYBSc - Semester I

COURSE CODE: SBSLSC101

PAPER –I CELL AND MICROBIAL BIOLOGY

Course Objectives

CO1: Identify and describe the structure and function of major cellular organelles

CO2: Classify microorganisms into different groups (bacteria, archaea, fungi, protozoa, viruses) based on their structural and functional characteristics.

CO3: Evaluate different physical and chemical methods used to control microbial growth, including sterilization techniques, disinfectants, and antimicrobial agents.

Course Outcomes

CLO1: The Learner will be able to understand the basics of microscopy, types of microscopes to visualize microbial cells, microorganisms.

CLO2: The Learner will be able to Compare and contrast the diverse microbes, Microbial diversity, the cell wall structure and its propagation.

CLO3: The Learner will be able to Gain knowledge about parameters of microbial growth and conditions for their control.

COURSE CODE: SBSLSC102

PAPER –II BIOMOLECULES AND SEPARATION TECHNIQUES

Course objectives

CO 1: Define biomolecules and classify them into major categories (carbohydrates, lipids, proteins, nucleic acids).

CO 2: Identify and explain the principles behind common molecular biology techniques (PCR, gel electrophoresis, cloning, sequencing).

CO 3: Describe the central dogma of molecular biology (DNA → RNA → protein) and its components.

Course outcomes

CLO 1: The Learner will be able to understand the biological molecules of living cells.

CLO 2: The Learner will be able to familiarize process of DNA synthesis.

CLO 3: The Learner will be able to different extraction, separation and analytical techniques.

Sophia College (Autonomous)

SEMESTER II

COURSE CODE: SBSLSC201

PAPER –I EUKARYOTIC CELL BIOLOGY

Course Objectives

CO1: Describe the structural components of the nucleus and cell membrane, including lipid bilayer composition, integral proteins, and peripheral proteins.

CO2: Identify major organelles such as mitochondria, endoplasmic reticulum (ER), Golgi apparatus, lysosomes, and peroxisomes.

CO3: Define the components of the cytoskeleton (microtubules, microfilaments, intermediate filaments) and their structural organization.

Course Outcomes

CLO1: The Learner will gain knowledge about the the structure and function of components of eukaryotic cell like nucleus, plasma membrane, chloroplast and mitochondria.

CLO2: The learner will be able to Learn about protein formation and trafficking through the endomembrane organelles.

CLO3: The learner will be to understand the processes and mechanism of cell division.

COURSE CODE: SBSLSC202

PAPER –II CLASSICAL GENETICS, ECOLOGY AND EVOLUTION

Course Objectives

CO 1: Explain the basic principles of inheritance, including Mendelian genetics, genetic variation, and the laws of segregation and independent assortment.

CO 2: Discuss mechanisms of genetic variation, including mutations, recombination, and genetic drift.

CO 3: Define ecological levels of organization (individual, population, community, ecosystem, biome) and their interactions.

Course Outcomes:

CLO 1: The learner will able to understand the history and basics of modern genetics.

CLO 2: The learner will able to understand the influence of the environment on survival of organism.

CLO 3: The learner will able to learn the theories on the origin of life and evolution.

Sophia College (Autonomous)

SYBSc Life Science

SEMESTER III

COURSE CODE: SBSLSC301

PAPER –I: COMPARATIVE PHYSIOLOGY- I

Course Objective:
CO 1: Outline physiology and homeostatic maintenance.
CO 2: Compare and contrast the control and coordination in plants and animals.
CO 3: Gain knowledge about sex determination and sexual differentiation

Course Outcome:
CLO1: The learner will be able to understand the outline physiology and homeostatic maintenance.
CLO2: The learner will be able to compare and contrast the control and coordination in plants and animals.
CLO3: The learner will be able to gain knowledge about sex determination and sexual differentiation.

COURSE CODE: SBSLSC302

PAPER –II: LIFE PROCESSES AT THE TISSUE, ORGAN AND ORGANISM LEVELS: A BIOCHEMICAL APPROACH- I

Course Objective:
CO 1: Familiarize students with the basic biochemical process in the cells and tissues and their regulation.
CO2: Acquaint the students to the lipid and protein catabolism by demonstrating its significance in terms of real-life examples.
CO3: Introduce students to different techniques used to extract and purify enzymes and the parameters to study enzyme kinetics and further how enzyme activity is regulated.

Course Outcome:
CLO1: The learner will be able to understand the basic biochemical process in the cells and tissues and their regulation.
CLO2: The learner will be able to familiarize between lipids and proteins catabolism by demonstrating its significance in terms of real life examples.
CLO3: The learner will be able to different techniques used to extract and purify enzymes and the parameters to study enzyme kinetics and further how enzyme activity is regulated.

Sophia College (Autonomous)

COURSE CODE: SBSLSC303

PAPER –III: POPULATION APPROACH: POPULATION AND COMMUNITIES AS REGULATORY UNIT-I

Course Objective:
CO 1: Familiarize students with the basic bioinformatics tools, database and application
CO2: Acquaint the students to statistics and data analysis.
CO3: Make the student understand the evolutionary concepts and population studies

Course Outcome:
CLO1: The learner will gain knowledge about the basic bioinformatics tools, databases and application.
CLO 2: The learner will be able to apprehend to the statistics and data analysis.
CLO3: The learner will be able to understand the evolutionary concepts and population studies.

SEMESTER IV

COURSE CODE: SBSLSC401

PAPER –I: Comparative physiology- II

Course Objectives
CO1: Interpret the Integration and coordination in the living system.
CO2: Gain knowledge of endocrine glands and hormones.
CO3: Identify the mechanisms of homeostasis during infections.

Course Outcomes
CLO 1: The learner will be able to understand the outline physiology and homeostatic maintenance.
CLO 2: The learner will be able to compare and contrast the control and coordination in plants and animals.
CLO 3: The learner will be able to gain knowledge about sex determination and sexual differentiation.

Sophia College (Autonomous)

COURSE CODE: **SBSLSC402**

PAPER –II: LIFE PROCESSES AT THE TISSUE, ORGAN AND ORGANISM LEVELS: A BIOCHEMICAL APPROACH- II

Course Objectives:
CO 1: Familiarize students with the basic biochemical process in the cells and tissues and their regulation.
CO2: Understand the molecular process involved in gene expression
CO3: Introduced to anabolism of biomolecules like carbohydrate, lipids and amino acids, further they will get deeper understanding photorespiration and C3 and C4 cycles in photosynthesis

Course Outcomes:
CLO 1: The learner will be able to familiarize with the basic biochemical process in the cells and tissues and their regulation.
CLO 2: The learner will be able to understand the molecular process involves in gene expression.
CLO 3: The learner will be able to understand the anabolism of biochemicals like carbohydrate, lipids and amino acids, further they will get deeper understanding photorespiration and C3 and C4 cycles in photosynthesis.

COURSE CODE: SBSLSC403

PAPER III POPULATION APPROACH: POPULATION AND COMMUNITIES AS REGULATORY UNIT-II

Course Objectives
CO1: Make students understand the significance of origin of species, and human evolution.
CO2: Familiarize with the biostatistics tests relevant to biological data collection.
CO3: provide a first-hand knowledge of the advanced in silico tools.

Course Outcomes
CLO1: The learner will be able to understand the significance of origin of species, and human evolution.
CLO2: The learner will be able to familiarize with the biostatistics tests relevant to biological data collection.
CLO3: The learner will be able to get a first-hand knowledge of the advanced in silico tools.

Sophia College (Autonomous)

TYBSc Life Science

SEMESTER V

COURSE CODE: SBSLSC501

PAPER I GENETICS AND IMMUNOLOGY I

Course Objectives

CO1: Understand the history of genetic organization of genomes subsequently gene expression and regulation.

CO2: Study the mechanism of genetic inheritance and variation.

CO3: Gain the knowledge about the immune system and its involvement in generating immune response.

CO4: Learn the significance of antigen antibody interaction and its downstream effects on effector mechanisms.

Course Outcomes:

CLO1: To summarize the discovery of the genetic material.

CLO2: To comprehend the complexity of nucleic acid and organization of eukaryotic and prokaryotic genome.

CLO3: To articulate gene regulation.

CLO4: To gain an understanding regarding the immune cells.

Sophia College (Autonomous)

COURSE CODE: **SBSLSC502**

PAPER II- DEVELOPMENTAL BIOLOGY AND NEUROBIOLOGY I

CO1: Introduce to the concepts in development biology with basic understanding of the processes involved
CO2: Further understanding the concepts like body plan, potency, regulatory development, spemann's organizer in development using model organism.
CO3: Detailed development in plants especially in the model plant Arabidopsis, further introduction to double fertilization and seed formation
CO4: Gain the understanding of general organization of the nervous system.
CO5: Understanding the cellular organization of the nervous system.

Course Outcomes

CLO1: The learner will be able to differentiate concepts like morphogen gradient, growth, morphogenesis and pattern formation.
CLO2: The learner familiarized with experimental approaches like fate mapping, large scale mutagenesis screens and use of transgenics to study development of model organisms
CLO3: The learner would have gained knowledge about plant development
CLO4: The learner will be able to describe the anatomical organization, functioning of the nervous system and its early development.
CLO5: The learner should be able to analyze the cellular basis of nerve conduction within a neuron and transmission across synapses.
CLO6: The learner will be able to describe the anatomical organization, functioning of the nervous system and its early development.

Sophia College (Autonomous)

COURSE CODE: **SBSLSC503**

PAPER III- BIOTECHNOLOGY AND GENETIC ENGINEERING I

Course Objectives

CO1: To introduce students with different aspects of fermentation technology and familiarize students with industrial production of food and beverage.

CO3: Understanding principle behind the working of instruments in Biotechnology.

CO4: To Familiarize students with Intellectual property rights.

CO5: Acquaint the students with the components of genetic engineering and biotechnology.

Course Outcome:

CLO1: The learner will be able to understand the process behind biotechnological products from biotechnological industries.

CLO2: The learner will be able to analyze, interpret the data coming from instruments used in Biotechnology.

CLO3: The learner will be able to apprehend the concepts of genetic engineering that includes details about the vector, restriction enzymes, DNA recombination and cloning.

CLO4: The learner will be able to compare and contrast the principle and procedure of tools and techniques used in recombinant DNA

CLO5: The learner will be able to understand the process behind biotechnological products from biotechnological industries.

CLO6: The learner will be able to analyze, interpret the data coming from instruments used in Biotechnology.

COURSE CODE: **SBSLSC504**

PAPER IV-ENVIRONMENTAL BIOLOGY-I

Course Objectives

CO1: To appraise the environment around us.

CO2: To introduce the fundamental concepts of environment and the biodiversity around us.

CO3: To introduce the India and Multilateral Environmental agreements.

CO4: Comprehend the significance of pests, pesticides, toxicology management.

Course Outcome:

CLO1: The learner will be able to identify issues and problems regarding the natural resources.

CLO2: The learner will be able to infer community and environment conservation.

CLO3: The learner will be able to understand the importance of toxicology management and the subsequent importance of Community and Environment Conservation.

Sophia College (Autonomous)

SEMESTER VI

COURSE CODE: **SBSLSC601**

PAPER I- GENETICS AND IMMUNOLOGY II

Course Objectives

CO1: Understanding the concept of gene mapping.
CO2: Studying the various tools and techniques involved in human genetics and recombination.
CO3: Learning about immune mediated hypersensitivity, infectious, vaccines and importance immunodeficiency diseases.
CO4: Introducing the concepts of transplantation, tumor immunology, tolerance and autoimmunity.

Course Outcomes

CLO1: The learner will be able to perform gene mapping using numerical problems
CLO2: The learner will be able to interpret the knowledge of gene recombination and mapping in detection of polymorphism and personalized medicine
CLO3: The learner will be able to compare and contrast between between different tools and techniques in molecular genetics

Sophia College (Autonomous)

COURSE CODE: SBSLSC602

PAPER II- DEVELOPMENTAL BIOLOGY AND NEUROBIOLOGY II

Course Objectives

CO1: Explains the molecular and cellular aspects of the important genes involved in early development in plants and animals.
CO2: Introduction to regeneration, advances in stem cell and regenerative medicine, apoptosis and types of cancer and the treatment strategies.
CO3: Describes the structural and functional features of the various sensory and motor systems.
CO4: Elaborates on some behavioral aspects such as sleep and memory.

Course Outcomes

CLO1: The learner will be able to differentiate between determination and trans determination.
CLO2: The learner would have the knowledge of the molecules deposited by the mother and the role of Maternal genes and zygotic genes.
CLO3: The learner would be familiar with the plant genome project.
CLO4: The learner will be able to describe the sensory and motor systems.
CLO5: The learner will be able to deduce the neurobiological basis of behavior and diseases that arise due to malfunction of the nervous system.
CLO6: The learner will be able to describe the sensory and motor systems

Sophia College (Autonomous)

COURSE CODE: **SBSLSC603**

PAPER III- BIOTECHNOLOGY AND GENETIC ENGINEERING II

Course Objectives
CO 1: Familiarizing learners with the process of production of enzyme and pharmaceutical products.
CO 2: Introducing learners to tissue culture techniques.
CO3: Inculcate the knowledge of transgenic animals and its applications.
CO4: Introduce the students to in silico and in vitro tools used in genetic engineering.

Course Outcomes
CLO1: The learner will be able to relate the application of fermentation technology in the production of various pharmaceutically important compounds.
CLO2: The learner will be able to comprehend the knowledge in understanding the application of genetic engineering tools in the field of medical/pharmaceutical and agricultural biotechnology.
CLO3: The learner will be able to understand the ethical, legal, and social Implications of recombinant DNA technology.
CLO4: The learner will be able to compare and contrast between different tools used in silico and in vitro tools used in genetic engineering.
CLO5: The learner will be able to relate the application of fermentation technology in the production of various pharmaceutically important compounds.

COURSE CODE: SBSLSC604

PAPER IV - ENVIRONMENTAL BIOLOGY II

Course Objectives
CO1: To comprehend the human dimension of development and its effect on the environment.
CO2: Aims to provide adequate insight on management of natural resources.
CO3: It introduces critical issues in environmental studies, both in an Indian and global perspective

Course Outcomes
CLO1: The learner will be able to interpret the process of urbanization with respect to consumption of resources.
CLO2: The learner will be able to analyze the environmental consequences of urban transformation, waste disposal and pollution.
CLO3: The learner will be able to interpret sustainability in relation to safety, health and environment.

Sophia College (Autonomous)

TYBSc AC Life Science

Semester V

Applied Environmental Sciences

Course code SBSAPC502

- **Course Objectives**
- **CO1**: Define key concepts in environmental science, including ecosystems, biodiversity, natural resources, and environmental sustainability.
- **CO2**: Discuss the role of environmental education in promoting awareness, understanding, and responsible behavior towards the environment.
- **CO3**: Outline the principles and objectives of environmental management, including risk assessment, pollution prevention, and environmental impact assessment (EIA).

- **Course Outcomes**
- **CLO1**: The learner will be able to learn the important concepts of environment and its impact on the interrelationship between various components of the environment
- **CLO2**: The learner will be able to recognize and raise awareness of the harmful effects of overexploitation of components in the environment resulting in balance shifts in ecosystems
- **CLO3**: The learner will be able to learn remediation techniques to mitigate the effects of anthropogenic activities on the environment

Environmental Management

Course code: **SBSAPC602**

- **Course Objectives**

CO1: Define biodiversity and its significance in maintaining ecosystem services, resilience, and human well-being.
CO2: Define "neo avenues" in the context of contemporary business opportunities and emerging markets.
CO3: Explain the roles of regulatory bodies, environmental impact assessments (EIA), and compliance standards in industrial consultancy.

Sophia College (Autonomous)

- **Course Outcomes**
- **CLO1**: The learner will able to explore possibilities within learners to be nature enthusiasts, passionate naturalists, adventurists and ecofriendly tourists.
- **CLO2**: The learner will be able to augment the avenues of employability and entrepreneurship in the arena of industrial consultancy
- **CLO3**: The learner will be able to develop an acumen to tap the potential for entrepreneurship with respect to environment related products and indoor plants

Life Science

MSc Part - I

SEMESTER I

COURSE CODE: SMSLSC101

PAPER –I MACROMOLECULES

Course objective
CO1: To learn fundamentals of thermodynamics.
CO2: To have an understanding of behaviour of molecules in context to thermodynamics.
CO3: To acquire a clear understanding of processes involving Nucleic acid biochemistry.
CO4: To understand details of protein structure and folding, and its relation to protein function.
CO5: To introduce the students to different techniques in macromolecular biology.

Learning Outcome:
CLO1: To enable understanding of Fundamental thermodynamics, basics of the molecules within the cell and their interactions.
CLO2: To enable understanding of Molecular process of DNA replication, transcription and translation; and post transcriptional modifications
CLO3: To have a clear understanding of protein biochemistry at molecular level. and the principle behind techniques involved in Macromolecular biology.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC102**

PAPER –II CELL BIOLOGY I

Course Objectives:
CO1: To enable understanding of microbial diversity and structure of prokaryotic cell.
CO2: To understand microbial growth and its control.
CO3: To introduce students to Organelles of eukaryotic cells – structure and function.
CO4: To understand concept of intercellular communication and various methods used to study cellular processes.

Learning Outcome
CLO1: The student will be able to Distinguish between different forms of bacteria and archaea.
CLO2: The student will be able to have thorough knowledge of characteristics of antibiotic drugs and the mode of action
CLO3: The student will be able to have understanding of Eukaryotic cell, the membrane, the organelles and the benefits of compartmentalization
CLO4: The student will be able to further understand the function of cytoskeleton and the importance of cell junctions

COURSE CODE: **SMSLSC103**

PAPER –III SYSTEMS BIOLOGY I

Course Objectives
CO1: The student will be able to familiarize the students to Physiological systems
CO2: The student will be able to Introduce the students to the basics of Immunology
CO3: The student will be able to Describe the significance of Host Parasite interactions and diseases
CO4: The student will be able to Illustrate and demonstrate the techniques used in physiology and

Learning Outcomes
CLO1: To enable understanding of Physiological systems that maintain homeostasis-Digestive, Circulatory, Excretory.
CLO2: To gain an understanding regarding the immune cells, organs of the immune system and immune response
CLO3: To understand the details about host parasite interactions and apply the knowledge while performing experiments
CLO4: To compare, contrast and also apply the techniques used in physiology and immunology during their project work.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC104**

PAPER –IV BIOINFORMATICS, TOXICOLOGY, BIOSTATISTICS I AND RESEARCH METHODOLOGY

Course Objectives
CO1: To apprehend the major classes of toxicology, different toxins, and route of exposure, risk assessment, prediction and management.
CO2: Demonstration and understanding of the central concepts of modern statistical theory and their probabilistic foundation.

Learning outcomes
CLO1: The students will be able to design, execute and statistically analyze experiments using the principles of scientific research methodology.
CLO2: The student will be able to Interpret results by using descriptive statistical methods effectively.

SEMESTER II

COURSE CODE: **SMSLSC201**

PAPER –I PRINCIPLES OF GENETICS

Course Objectives
CO1: To understand the theory of classical genetics
CO2: To understand the DNA repair mechanism
CO3: To acquire detailed understanding of Regulation of gene expression.
CO4: Introduce techniques in genetics

Course Outcome:
CLO1: Explain the concept of Classical genetics.
CLO2: Understand the processes involved in regulation of genes.
CLO3: Understand different tools in genetics and to apply these techniques for genetic manipulation.
CLO4: To understand concepts involved in recombination, mutation, repair & regulation of gene expression in bacteria and eukaryotes

Sophia College (Autonomous)

COURSE CODE: **SMSLSC202**

PAPER –II CELL BIOLOGY II

Course Objectives:
CO1: To enable understanding of the basics of cell division and cell cycle and molecules in cell cycle regulation.
CO2: To understand cell signaling with examples and cell death processes and pathways involved.
CO3: Introduction to autophagy, its machinery and examples.
CO4: Introduction to techniques in cell cycle analysis, apoptosis, autophagy and cell signaling.

Learning Outcome:
CLO1: Learn to Differentiate between different cell cycle stages and gain knowledge about cyclins and cyclin dependent kinases.
CLO2: Learn to Differentiate between morphological and cellular changes due to necrosis and apoptosis.
CLO3: Learn to Differentiate between different kinds of cell signaling with the receptors and signal transduction.
CLO4: Students will gain knowledge about techniques used in cell biology like TUNEL assay, Comet assay, autophagy marker assay, MTT cell proliferation assay and cell signaling kinase assay.

COURSE CODE: **SMSLSC203**

PAPER –III SYSTEMS BIOLOGY- II

Course Objectives
CO1: To Understand in detail about the Endocrine, Reproductive and Nervous systems.
CO2: To Study the concepts of development biology.
CO3: Introduces the details about different types of model systems used in developmental biology.
CO4: To Outline the fundamentals of different tools used in systems biology.

Learning Outcomes:
CLO1: The student will be able to Understand the function and organization of Endocrine, Reproductive and Nervous systems.
CLO2: The student will be able to Comprehend the different stages of development.
CLO3: The student will be able to Inculcate and apply the knowledge of the model system while proposing objectives for their project work.
CLO4: The student will be able to Compare, contrast and apply the knowledge of different tools for their project work.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC204**

PAPER –IV EVOLUTION, POPULATION BIOLOGY, BIOSTATISTICS- II AND BIOINFORMATICS

Course objective
CO1: To infer evolutionary concepts and population studies.
CO2: To outline fundamentals of biostatistics and bioinformatics.
CO3: To introduce students into the world of 'omics' with a bioinformatics perspective.

Learning outcomes.
CLO1: The students will be able to familiarize themselves with various biological databases/tools and their applications.
CLO2: The students will be able to understand and analyze sequences and construct phylogenetic trees.
CLO3: The student will be able to understand various biological databases/tools and their applications and analyze sequences and construct phylogenetic.

Sophia College (Autonomous)

Life Science

MSc Part - II

SEMESTER III

COURSE CODE: SMSLSC301

PAPER –I CELLULAR ORGANIZATION OF THE NERVOUS SYSTEM

Course Objectives:
CO1: To introduce students to neuroscience by giving them a historical perspective and dawn of neuroscience.
CO2: Introduction to primitive nervous system and basic plan of vertebrate nervous system.
CO3: Introduction to the structural and functional features of Neuron and Glia.
CO4: Introduction to types of synapses, neurotransmitters and their functional localization and introduction to different electrophysiological techniques and computational neuroscience.

Learning outcomes:
CLO1: Differentiate between Mind and brain, between the primitive nervous system and Cephalization in Molluscs.
CLO2: Catagorize between types of neurons, types of glia and their function in addition they will also learn about electrical properties of the neuron.
CLO3: Compare between the different types of synapse and neurotransmitters.
CLO4: Differentiate between electrophysiological techniques like Patch clamp and Voltage clamp.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC302**

PAPER –II ORGANISATION AND FUNCTIONAL MODIFICATION OF THENERVOUS SYSTEM

Course Objectives:
CO1: To introduce the basics of nerve and muscle physiology.
CO2: To introduce the basics of Neural – Immune interactions and Clinical implications of neural – immune signaling.
CO3: To introduce the basics of gut microbiome and nervous system.
CO4: To introduce the fundamentals of the tools related advanced neurogenetics and imaging techniques

Learning outcomes:
CLO1: interpret the mechanism of signal transmission at the neuromuscular junction and muscle contraction.
CLO2: understand the correlation between nervous and immune system, its effect on behavior & clinical implication.
CLO3: comprehend the effect of the gut microbiome on the nervous system and neurodegenerative diseases.
CLO4: learn the fundamentals of advanced techniques in Neurogenetics and Imaging.

COURSE CODE: **SMSLSC303**

PAPER –III SYSTEMS APPROACH TO NEUROSCIENCES I

Course Objectives:
CO1: To enable the understanding of anatomical and functional organization of the nervous system.
CO2: To demonstrate the comprehensive information about the structure, organizations and functional connectivity of the CNS and PNS.

Learning outcomes:
The student will be able to
CLO1: Categorize the autonomic and enteric nervous system and also with the integration of autonomic and endocrine functions with behavior.
CLO2: Further the implications of pathogenic diseases along with the neuroimaging techniques.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC304**

PAPER –IV SYSTEMS APPROACH TO NEUROSCIENCES II

Course Objectives:

CO1: To introduce the students to process behind Sensory detection and encoding of neural signaling.
CO2: To introduce the conscious perception and awareness with respect to neural signaling processing
CO3: Understand Ethical, legal, social impact of imaging techniques and use of cognitive enhancers.

Learning outcomes:
CLO1: Delineate the process and mode of transduction of sensory stimulus, their detection, and encoding of neural signaling pathway.
CLO2: Explain structural features of muscle, transmission of nerve signal leading to muscle contraction, displacement and movement.
CLO3: Inculcate the ethical, legal, social impact of imaging techniques and use of cognitive enhancers.

SEMESTER IV

COURSE CODE: **SMSLSC401**

PAPER –I DEVELOPMENT NEUROBIOLOGY

Course Objectives:
CO1: To enable understanding of the various processes involved in development of a functional nervous system.
CO2: Introduction to disorders and genetic diseases associated with the developing brain.
CO3: Understand Sexual Differentiation of the Nervous System.
CO4: Introduction to Aging of the brain and its associated diseases.

Learning objectives
CLO1: Interpret the mechanism of signal transmission at the neuromuscular junction and muscle contraction.
CLO2: Understand the correlation between nervous and immune system, its effect on behavior & clinical implication
CLO3: Comprehend the effect of the gut microbiome on the nervous system and neurodegenerative diseases.
CLO4: Learn the fundamentals of advanced techniques in Neurogenetics and Imaging

Sophia College (Autonomous)

COURSE CODE: **SMSLSC402**

PAPER –II BEHAVIOURAL NEUROBIOLOGY

Course Objectives:
CO1: Introduce to brain and behavior.
CO2: Familiarize the students with Cognitive development and associated Behavioral Disorders.
CO3: Familiarize the students with terms related to emotions, sleep and dreams, and Consciousness.

Learning objectives
CLO1: Develop the knowledge about the Brain and behavior, connections established between the physiology and functions of the brain to the activities.
CLO2: Inculcate the insight about the cognitive and emotional aspects of the brain.
CLO3: Learn about the diseases associated with the behavioral disorders and neurological correlates of sleep.

COURSE CODE: SMSLSC403

PAPER –III BEHAVIOURAL NEUROSCIENCES II

Course Objectives:
CO1: To explore the fundamental principles, classifications, and mechanisms of learning and memory, emphasizing both explicit and implicit memory systems.
CO2: To examine the cellular, molecular, and neural pathways involved in memory formation and synaptic plasticity, with model systems like Aplysia and mammalian hippocampal neurons.
CO3: To introduce the interdisciplinary field of neuroeconomics and neuromarketing, focusing on decision-making, subjective value, sensory processing, and consumer behavior.

Learning objectives
CLO1: Identify the neural systems involved in memory, such as the medial temporal lobe, prefrontal cortex, and association areas.
CLO2: Compare human language with communication in other animals, such as bird songs.
CLO3: Able to apply neuroscience to marketing, use of imaging technology and to understand consumer behavior.

Sophia College (Autonomous)

COURSE CODE: **SMSLSC404**

PAPER –IV MOLECULAR NEUROBIOLOGY AND DISEASE PATHOLOGY

Course Objectives:
CO1: To familiarize students with the aspects of neuro toxicology and neuro pharmacology.
CO2: To understand the processes behind neurodegenerative diseases of nervous system.
CO3: To Introduce students with recent techniques in experimental neuroscience.
CO4: To make students aware of the neuroethics and IPR related with neuroscience.

Learning objectives
CLO1: Understand details of neurotoxicology and neuropharmacology.
CLO2: Interpret pathophysiology of degenerative disease of nervous system.
C**LO3**: Able to understand the recent techniques in experimental neuroscience.
C**LO4**: Aware conscious about neuroethics.
CLO5: Guage the importance of IPR in context to neuroscience.