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School of Biological Engineering & Sciences

Bachelor of Science (Microbiology, Honors)

Program Outcomes, Program Specific Outcomes & Course Outcomes
(POs, PSOs& COs)

Program Outcomes

Program Outcome		Statement
PO 1	Engineering* (Area Specific) Knowledge	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem Analysis	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	Design/ Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO 4	Conduct investigations of complex problems	Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO 5	Modern Tool Usage	Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an under-standing of the limitations.
PO 6	The Engineer* (Area Specialist) and Society	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO 7	Environment and Sustainability	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development

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PO 8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO 9	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO 10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11	Project Management and Finance	Demonstrate knowledge and understanding of engineering and management principles and apply these to owners own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long Learning	Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

Program Specific Outcome	Statement
PSO 1	Graduates will possess a strong foundation in microbiological principles, methodologies, and techniques, enabling them to excel in various researches, industrial, and academics.
PSO2	Graduates adeptly to tackle real-world challenges in microbiology with innovative new technologies and sustainable solutions, develop biotechnological products showcasing critical thinking and problem-solving skills and staying abreast of emerging trends, technologies, and methodologies.
PSO 3	Graduates prioritize ethical microbiological practices, committing to socially responsible and environmentally sustainable research, with a lifelong learning mindset.

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Course Outcomes (COs)

1st Semester

Course: Cell Biology

Course Outcomes	Statement
CO 1	Structural characteristics of prokaryotic and eukaryotic cells.
CO 2	Taxonomy and characteristics of the major kingdoms.
CO 3	Basic concepts of bioenergetics, photosynthesis, and cellular respiration.
CO 4	Nucleic acids and basic concepts of protein synthesis and gene regulation.
CO 5	Mendelian genetics and genetic change.

Course: Introductory Biology

Course Outcomes	Statement
CO 1	Understanding Biological Concepts.
CO 2	Students will develop the ability to apply the scientific method to biological inquiries.
CO 3	Cellular and Molecular Biology Knowledge.
CO 4	Genetics and Heredity Understanding.
CO 5	Biochemical and Metabolic Insights.

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Course: Fundamentals of Biology

Course Outcomes	Statement
CO 1	Understanding Biological Principles and Systems.
CO 2	Proficiency in Scientific Inquiry and Methods.
CO 3	Biochemical and Molecular Biology Insights.
CO 4	Cellular Function and Division Understanding.
CO 5	Comprehending Evolution and Adaptation.

Course: Inorganic & Physical Chemistry

Course Outcomes	Statement
CO 1	Understand periodic properties and its application in the characterization of chemical compounds.
CO 2	Understand the various properties of materials depending upon bond formation.
CO 3	Utilize the concept of hardness in the purification of water for industrial and domestic purpose.
CO 4	Distinguish the rate laws and application to different chemical reaction mechanism.
CO 5	Learn the basic concepts of Chemistry and its application in different fields.

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Course: Computer Fundamentals

Course Outcomes	Statement
CO 1	Students will be able to identify computer hardware components and describe their function
CO 2	To identify and describe telecommunication components;
CO 3	Students will be able to compare the roles of different sectors of the information technology.
CO 4	Students will be able to use a hypertext markup language to produce basic Web documents.
CO 5	To describe the characteristics of operating systems and compare different operating systems

Course: Ecology and Environment Management

Course Outcomes	Statement
CO 1	Students will be able to understand the importance of environment.
CO 2	Students will gain new insights about different remediation procedures.
CO 3	Students will be able to understand ecological sustainability, ecological efficiencies, homeostasis and limiting factors.
CO 4	Students will be able to apply the knowledge of scientific methods to solve environmental problems.

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Course: Professional Communication

Course Outcomes	Statement
CO 1	Sharpen grammatical skills of the students, to facilitate easy choice of available options
CO 2	CO- 2 Construct the vocabulary of the students to assist them acquire plethora of knowledge of foreign as well as indigenous languages.
CO 3	Exhibit competent writing that is reasonably proficient in correct grammar and sentence structure skills.
CO 4	Improve awareness regarding the factors at play when communicating with audience of diverse backgrounds in the global business environment.

Course: Personality Development

Course Outcomes	Statement
CO 1	Students will develop a deeper understanding of their personality traits, strengths, and weaknesses
CO 2	Goal Setting and Personal Development Planning
CO 3	Students will understand the significance of non-verbal communication, including body language, posture, gestures, and facial expressions.
CO 4	Students will gain practical strategies for boosting their self-confidence and self-esteem.

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Course: Personal Grooming

Course Outcomes	Statement
CO 1	Students will develop the necessary soft skills for career success, including networking.
CO 2	The ability to handle workplace challenges.
CO 3	Graduates will be career-ready, equipped with the skills and confidence.
CO 4	Choosen professions, achieve career advancement, and maintain a fulfilling life balance.

Course: Ethics of Research

Course Outcomes	Statement
CO 1	Understand the core ethical principles that govern research practices
CO 2	Identify and resolve ethical issues in research scenarios
CO 3	Evaluate and ensure ethical treatment of animal subjects in research
CO 4	Promote ethical collaboration in international and cross-cultural research settings.

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Course: General Proficiency-I

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion
CO 3	Integrative thinking: The ability to synthesize knowledge across different domains and perspectives
CO 4	Preparing students to be engaged citizens: Preparing students to participate in political culture and thrive in a rapidly evolving world

Course: Physical Education & Yoga

Course Outcomes	Statement
CO 1	Use yoga and physical activity to promote mental well-being, stress relief, and emotional balance
CO 2	Demonstrate knowledge of sports injury prevention and provide first aid.
CO 3	Teach and lead others in yoga classes and fitness sessions.
CO 4	Foster a holistic approach to health, combining physical activity, nutrition, and mental wellness

Course: Health & Nutrition

Course Outcomes	Statement
CO 1	Understanding the essential nutrients required for the body, including carbohydrates, proteins, fats, vitamins, and minerals.
CO 2	Nutrition plays a crucial role in enhancing energy levels, muscle recovery, and overall performance.
CO 3	Development of Healthy Eating Habits.
CO 4	With proper nutrition, individuals can achieve and maintain a healthy weight, improve cardiovascular health.

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Course Outcomes (COs)
2nd Semester

Course: Organic & Analytical Chemistry

Course Outcomes	Statement
CO 1	Understand the basic concepts of different purification techniques of organic compound
CO 2	Apply basic concepts of organic chemistry in determining the types of organic reactions
CO 3	Categories various types of polymer and their uses.
CO 4	Predict the importance of organic reactions in daily life.

Course: Observational Chemistry

Course Outcomes	Statement
CO 1	Develop Proficiency in Laboratory Techniques
CO 2	Enhance Observational and Analytical Skills
CO 3	Understand and Identify Chemical Reactions
CO 4	CO-4Investigate the Physical Properties of Matter
CO-5	CO-5Conduct Qualitative Analysis of Inorganic Compounds

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Course: Basic & Applied Chemistry

Course Outcomes	Statement
CO 1	Understand the fundamental concepts of atomic structure, chemical bonding, and periodic properties.
CO 2	Apply the principles of thermodynamics and kinetics to analyze chemical reactions and energy changes.
CO 3	Develop problem-solving skills in solutions, equilibrium, and electrochemistry to solve real-world challenges.
CO 4	Demonstrate knowledge of organic and inorganic chemistry in industrial and environmental applications.
CO 5	Utilize analytical techniques and laboratory skills for qualitative and quantitative chemical analysis.

Course: Elements of Biochemistry

Course Outcomes	Statement
CO 1	Students will be able to define biomolecules and buffers.
CO 2	Students will understand the structure and functions of biomolecules.
CO 3	Students will be able to classify and explain the role of various biomolecules in human body.
CO 4	Students will be able to analyze the causes of diseases on biochemical basis.
CO 5	Students will be able to understand various biochemical process and cell metabolism.

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Course: Fundamentals of Biochemistry

Course Outcomes	Statement
CO 1	Understand the chemical structure, properties, and biological roles of carbohydrates, proteins, lipids, and nucleic acids.
CO 2	Explain enzyme mechanisms, factors affecting enzyme activity, and their significance in metabolic regulation.
CO 3	Understand Metabolic Pathways and Bioenergetics.
CO 4	Illustrate the central dogma of molecular biology, including DNA replication, transcription, translation, and gene expression regulation.
CO 5	Relate biochemical processes to physiological functions, diseases, and clinical applications.

Course: Introductory Human Physiology

Course Outcomes	Statement
CO 1	Explain fundamental physiological concepts, including homeostasis, cell function, and organ system interactions
CO 2	Describe the structure and function of key human organ systems, such as the circulatory, respiratory, nervous, muscular, and digestive systems.
CO 3	Analyze how the human body responds to internal and external stimuli, including the role of the nervous and endocrine systems in regulation.
CO 4	Relate physiological mechanisms to common health conditions and diseases, understanding their impact on homeostasis.
CO 5	Interpret physiological data, analyze case studies, and apply concepts to real-world medical and health-related scenarios.

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Course: Chemicals and Health

Course Outcomes	Statement
CO 1	Explain how different chemicals (natural and synthetic) interact with the human body and impact health.
CO 2	Recognize sources of chemical exposure in everyday life, including food, air, water, and consumer products.
CO 3	Describe how chemicals can cause acute and chronic health effects, including toxicity, bioaccumulation, and long-term diseases
CO 4	Apply Knowledge to Personal and Public Health
CO 5	Understand chemical safety regulations, such as permissible exposure limit, and learn strategies to minimize risks.

Course: Introduction to General Microbiology

Course Outcomes	Statement
CO 1	To understand the structural similarities and differences among microorganisms and the unique structure/function relationships of prokaryotic cells.
CO 2	To understand the science of microbiology, its development and importance in human welfare.
CO 3	To apply laboratory practices used in the study of microorganisms.
CO 4	To recognize and compare structure and function of microbes and factors affecting microbial growth.
CO 5	To explain and apply aseptic microbiological techniques in the laboratory and check sources of microbial contamination and their control.

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Course: Elements of Microbiology

Course Outcomes	Statement
CO 1	Develop an understanding of microbial classification and nomenclature.
CO 2	Gain proficiency in laboratory techniques for culturing, isolating, and identifying microorganisms.
CO 3	Understand the role of microorganisms in disease causation, immunity, and human health.
CO 4	Appreciate the ecological roles of microorganisms in different environments.
CO 5	Learn about the applications of microbiology in industries, medicine, and environmental science.

Course: Chemical Microbiology

Course Outcomes	Statement
CO 1	Have a deep understanding of microbial metabolism and biochemical processes.
CO 2	Be able to apply chemical principles to understand microbial function in health, disease, and the environment
CO 3	Demonstrate proficiency in laboratory techniques related to microbial biochemistry.
CO 4	Be capable of analyzing the effects of various chemicals on microbial growth and activity.
CO 5	Understand the role of microorganisms in industrial applications such as fermentation, antibiotic production, and bioremediation.

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Course: Microbial Technology

Course Outcomes	Statement
CO 1	Understand the principles and applications of microbial technology
CO 2	Comprehend microbial growth and metabolism processes.
CO 3	Apply fermentation technology for industrial production.
CO 4	Master enzyme technology and its applications in various industries
CO 5	Understand microbial genetics and genetic engineering techniques.
CO 6	Apply microbial technology for environmental and agricultural solutions.

Course: Career Skills

Course Outcomes	Statement
CO 1	Enhance the Vocabulary of the students to make them corporate ready.
CO 2	Improve the Logical ability among the students.
CO 3	Discover the key skills required to bridge the gap between campuses and corporate
CO 4	Enhance the problem solving skills of the students.
CO 5	Improve the Quantitative ability of the students.

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Course: Life Skills

Course Outcomes	Statement
CO 1	Enhanced self-awareness and emotional intelligence for managing personal and interpersonal interactions.
CO 2	Improved communication skills for effective expression and understanding in various contexts.
CO 3	Stronger critical thinking and problem-solving skills to approach real-world challenges effectively.
CO 4	Ability to make informed decisions and set achievable goals for personal and professional growth.
CO 5	Mastery of stress management and resilience-building techniques for coping with pressure and adversity.

Course: General Proficiency-II

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion
CO 3	Integrative thinking: The ability to synthesize knowledge across different domains and perspectives
CO 4	Preparing students to be engaged citizens: Preparing students to participate in political culture and thrive in a rapidly evolving world

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Course Outcomes (COs)
3rd Semester

Course: Microbial Genetics

Course Outcomes	Statement
CO 1	Learn different types of plasmids and their applications
CO 2	Apply mechanism of prokaryotic and eukaryotic DNA replication in molecular genetics
CO 3	Understand the mechanism of gene transfer in micro-organisms
CO 4	Comprehend concepts of phages genetics
CO 5	Become familiar about transposons

Course: Inheritance and Evolutionary Biology

Course Outcomes	Statement
CO 1	Learn different types of plasmids and their applications
CO 2	Apply mechanism of prokaryotic and eukaryotic DNA replication in molecular genetics
CO 3	Understand the mechanism of gene transfer in micro-organisms
CO 4	Comprehend concepts of phages genetics
CO 5	Become familiar about transposons.

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Course: Microbiological Basis of Inheritance

Course Outcomes	Statement
CO 1	Students will be able to define and explain the fundamental laws of genetics
CO 2	Students will be able to understand the main modes of Mendelian and non- Mendelian inheritance
CO 3	Students will acquire knowledge about the chromosome structure, sex linked chromosomes and inherited disorders
CO 4	Students will be able to understand how alterations in chromosome number or structure may cause various types of diseases
CO 5	To describe how mutation is caused in DNA and how DNA damage can be repaired
CO 6	Students will be able to apply their knowledge to healthy and disease contexts.

Course: Food Engineering

Course Outcomes	Statement
CO 1	Students will be able to know about the basics of food technology
CO 2	Students would know about the microorganisms associated with food.
CO 3	Students will understand various principles of food technology.
CO 4	Students will also have knowledge of food preservation methods.

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Course: Bacteriology & Virology

Course Outcomes	Statement
CO 1	Describe the cell organization of bacteria i.e. morphology, ultrastructure and organelles present in bacterial cells.
CO 2	Describe the nutritional and physical requirements for bacterial growth
CO 3	Describe the principles involved in killing bacteria, and make recommendations on use of physical and chemical methods used to control microbial growth.
CO 4	Describe the dynamics of the growth of a bacterial population and how this growth can be measured.
CO 5	Learn the methods of laboratory diagnosis of viruses using different techniques.
CO 6	Learn about different plant and animal viruses.

Course: Global Ecology

Course Outcomes	Statement
CO 1	Understand and explain fundamental ecological principles, processes, and interactions in the context of global environmental systems.
CO 2	Analyze the impact of human activities on the environment and global ecosystems.
CO 3	Evaluate the causes and consequences of global environmental challenges, including climate change, biodiversity loss, and pollution.
CO 4	Develop and propose sustainable solutions and conservation strategies to address global ecological issues.
CO 5	Use scientific tools and methods, such as GIS, fieldwork, and ecological modeling, to study global ecological problems.

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Course: Mycology & Phycology

Course Outcomes	Statement
CO 1	Students should be able to know about various groups of fungi and algae.
CO 2	As most of the fungi are seen through naked eyes, students will be able to recognize them.
CO 3	Students will also have an idea about the pros and cons of fungi and algae
CO 4	Students should be able to know about economic importance of fungi and algae.

Course: Public Health and Pandemics

Course Outcomes	Statement
CO 1	Explain key concepts in public health, including epidemiology, disease prevention
CO 2	Analyze the causes, spread, and impact of pandemics while evaluating strategies for prevention, mitigation, and response.
CO 3	Assess the role of governments, health organizations, and communities in managing public health crises.
CO 4	Health Communication and Education – Develop effective strategies for public health messaging.
CO 5	Evaluate ethical dilemmas and public health policies related to pandemic response, including vaccination, lockdowns, and resource allocation.

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Course: Biofertilizers and Biopesticide

Course Outcomes	Statement
CO 1	Learn the basic concept of microbial interactions.
CO 2	Understand the role of microbes as Biofertilizers.
CO 3	Learn basic understanding of role of microbes as bio insecticides.
CO 4	Understanding bio fertilizers and Their Role in Sustainable Agriculture

Course: Biomathematics and Biostatistics

Course Outcomes	Statement
CO 1	Students will understand the use of mathematics and the significance of their application.
CO 2	Students will be able to understand the concept of Biostatistics.
CO 3	Explain the application of probability for Bio Students.
CO 4	Students will be able to understand sampling theory
CO 5	Students will be able to learn Basic concept of Algebra.

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Course: Elementary Mathematics

Course Outcomes	Statement
CO 1	Define and appropriately use information technology terms;
CO 2	Describe the essential elements of the computer's architecture and discuss how this architecture functions;
CO 3	Describe the characteristics of operating systems and compare different operating systems;
CO 4	Discuss the general trends in technologies including examples of leading edge developments;
CO 5	Compare the roles of different sectors of the information technology.
CO 6	Describe the characteristics and representations of data, and interpret and compare data in different representations.

Course: General Proficiency-III

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion
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Course: Psychology

Course Outcomes	Statement
CO 1	Define and explain core concepts in psychology, including behavior, mental processes, sensation, perception, and learning.
CO 2	Apply theories from different areas of psychology (cognitive, behavioral, humanistic, etc.) to real-world problems
CO 3	Apply scientific methods to analyze psychological phenomena, conduct research, and interpret data.
CO 4	Explain key psychological theories and principles that influence human thoughts, emotions, and behaviors.
CO 5	Utilize psychological concepts to address real-world issues in mental health, relationships, workplace dynamics, and personal development.

Course: Sociology

Course Outcomes	Statement
CO 1	Understanding Social Structures and Institutions
CO 2	Critical Thinking and Sociological Perspectives
CO 3	Conduct Sociological Research
CO 4	Real-World Application of Sociology
CO 5	Understand Sociological Concepts

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Course Outcomes (COs)
4th Semester

Course: Molecular Biology

Course Outcomes	Statement
CO 1	Students will gain an understanding of molecular biology of nucleus and its effect of functioning of an organism.
CO 2	Students will understand the concepts of DNA, RNA and will develop an insight into the mechanism of DNA replication in the cell.
CO 3	Students will learn about the physiochemical reasons of damage of DNA and their effect on body functioning and will be able to analyze the in vivo mechanism of repair of DNA 11 5 damage and recombination processes.
CO 4	Students will develop an understanding of formation of RNA, different mechanisms in prokaryotes and eukaryotes and processing of final transcriptional products.
CO 5	Students will be able to understand the process of protein formation and its control.
CO 6	Students will be able to analyze the mechanisms of gene expression and its regulation.

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Course: Economic Biology

Course Outcomes	Statement
CO 1	Students will gain an understanding of molecular biology of nucleus and its effect of functioning of an organism.
CO 2	Students will understand the concepts of DNA, RNA and will develop an insight into the mechanism of DNA replication in the cell.
CO 3	Students will learn about the physiochemical reasons of damage of DNA and their effect on body functioning and will be able to analyze the in vivo mechanism of repair of DNA damage and recombination processes.
CO 4	Students will develop an understanding of formation of RNA, different mechanisms in prokaryotes and eukaryotes and processing of final transcriptional products.
CO 5	Students will be able to understand the process of protein formation and its control.
CO 6	Students will be able to analyze the mechanisms of gene expression and its regulation.

Course: Gender Studies

Course Outcomes	Statement
CO 1	To familiarize the students with the terminologies related to Gender studies.
CO 2	To elaborate the concept of patriarchy and its impact on women.
CO 3	To introduce students to the discipline of Women's Studies and Gender Studies and its perspectives.
CO 4	To trace the evolution of Gender Studies from Women's Studies. Learning outcomes.
CO 5	Familiarity with fundamental concepts related to field of women and gender studies.

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Course: International Business in Dairy Science

Course Outcomes	Statement
CO 1	Students will be able to know about the microorganisms important in food microbiology.
CO 2	Students would know about the factors influencing microbial growth in food.
CO 3	Students will understand various food borne diseases.
CO 4	Students will also have knowledge of microbiology of milk.
CO 5	Students will understand microorganisms as source of food.

Course: Immunology

Course Outcomes	Statement
CO 1	Students will be able to define and explain the fundamental principles of modern immunology.
CO 2	Students will be able to classify antibodies on the basis of their structures and functions.
CO 3	Students will be able to understand related immunological techniques and apply them in medical laboratory profession.
CO 4	Students will acquire knowledge about processing and presentation of antigens by different methods.
CO 5	Student will be able to understand cell mediated immune response.
CO 6	Students will be able to value role of immune system in different diseases.
CO 7	Students will be able to apply their knowledge to healthy and disease contexts.

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Course: Anthropology

Course Outcomes	Statement
CO 1	After completion of the course the students will be able to understand the microbial growth in different physiological conditions.
CO 2	Learn the phenomenon of nutrient utilization of microbes.
CO 3	Comprehend the concept of microbial respiration and their metabolism.

Course: Neurobiology

Course Outcomes	Statement
CO 1	Gain a strong foundation in the fundamental principles of neurobiology, including the physiology of neurons, synaptic transmission, and cellular mechanisms.
CO 2	Understand the molecular basis of neural signaling, including ion channels, receptors, and neurotransmitter systems.
CO 3	Identify and describe the key structures of the central and peripheral nervous systems (e.g., brain regions, spinal cord, sensory and motor pathways).
CO 4	Understand how neural circuits and networks contribute to sensory processing, motor control, and higher cognitive functions.

Course: Nanotechnology

Course Outcomes	Statement
CO 1	Understand nanoscale materials: Learn about the unique properties of materials at the nanoscale.
CO 2	Manipulate nanomaterials: Master techniques for synthesizing and manipulating nanomaterials.
CO 3	Develop innovative applications: Create new devices and applications for various sectors.

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Course: Microbial Physiology & Metabolism

Course Outcomes	Statement
CO 1	Understand the microbial growth in different physiological conditions.
CO 2	Learn the phenomenon of nutrient utilization of microbes.
CO 3	Comprehend the concept of microbial respiration and their metabolism.

Course: Entomology

Course Outcomes	Statement
CO 1	Understand principles, ways of thinking.
CO 2	Modes of analysis in chemistry, physics, and mathematics.
CO 3	Be able to design basic statistical analyses and evaluate basic statistical information.
CO 4	Be able to apply and judge the scientific method in conducting inquiry-based research in the laboratory and in the field.

Course: General Proficiency-I

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect.
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion.
CO 3	Integrative thinking: The ability to synthesize knowledge across different domains and perspectives.
CO 4	Preparing students to be engaged citizens: Preparing students to participate in political culture and thrive in a rapidly evolving world.

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Course: Agrostology

Course Outcomes	Statement
CO 1	To provide students with a basic understanding of biological principles.
CO 2	To explore the structure and function of living organisms at the molecular, cellular, and systemic levels.
CO 3	To introduce fundamental concepts in genetics, evolution, ecology, and human biology.
CO 4	To foster scientific inquiry and an appreciation for the relevance of biology in daily life, health, and the environment.

Course: Pharmaceutical Microbiology

Course Outcomes	Statement
CO 1	Understand the methods of drug development, production and mechanism of action and delivery.
CO 2	Know the processes involved in manufacturing.
CO 3	Understand biomaterials and their used in pharmaceutical industry.

Course: Medicinal Microbiology

Course Outcomes	Statement
CO 1	To understand the principles of microbiology in relation to human health.
CO 2	To learn about the pathogens causing diseases, their transmission, and pathogenesis.
CO 3	To study antimicrobial agents and their mechanisms of action.
CO 4	To explore diagnostic techniques for infectious diseases.
CO 5	To gain knowledge of emerging infectious diseases and antimicrobial resistance.

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Course: I.P.R., Bioethics & Biosafety

Course Outcomes	Statement
CO 1	Students will understand with the importance of intellectual property and its protection under the constitution.
CO 2	Students will be able to classify patent able subject matter under the realm of Biotechnology.
CO 3	Students will be familiar with the basic principles of bioethics.
CO 4	Students will be able to analyze ethical issues related to biotechnology research.
CO 5	Students will be able to apply their knowledge to deal with hazards related to biotechnology and the importance of biosafety in research.

Course: General Proficiency

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion.
CO 3	Integrative thinking: The ability to synthesize knowledge across different domains and perspectives.
CO 4	Preparing students to be engaged citizens: Preparing students to participate in political culture and thrive in a rapidly evolving world

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Course: Animal Behavior

Course Outcomes	Statement
CO 1	Develop an understanding of fundamental principles and theories related to animal behavior, including key concepts such as innate vs. learned behaviors, proximate vs. ultimate causes, and behavioral ecology.
CO 2	Gain insight into how animal behavior is shaped by both genetic and environmental factors
CO 3	Explore how animal behaviors develop across the lifespan, including the role of imprinting, critical periods, and social learning in the development of complex behaviors.

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Course Outcomes (COs)
5th Semester

Course: Medical Microbiology

Course Outcomes	Statement
CO 1	This course provides learning opportunities in the basic principles of medical microbiology and infectious disease.
CO 2	It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body"s normal microflora.
CO 3	The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body.
CO 4	It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
CO 5	To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.
CO 6	Helps to understand the use of lab animals in medical field.
CO 7	Recall the relationship of this infection to symptoms, relapse and the accompany in pathology.
CO 8	Explain the methods of microorganism's control, e.g. chemotherapy & vaccines. Solve problems in the context of this understanding.

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Course: Medicinal Microbiology

Course Outcomes	Statement
CO 1	Explain the morphology, physiology, and genetics of medically significant microorganisms (bacteria, viruses, fungi, and parasites)
CO 2	Describe the mechanisms of microbial pathogenesis, including host-pathogen interactions and immune responses to infections.
CO 3	Demonstrate knowledge of infectious diseases caused by various pathogens, their clinical manifestations, and methods of prevention.

Course: Recombinant DNA Technology

Course Outcomes	Statement
CO 1	The student will be familiar with the historical background and important milestones, biosafety and bioethics in genetic engineering.
CO 2	The student will be acquainted with tools of RDT like enzymes, vectors and hosts.
CO 3	The student will be acquainted with technical knowhow of gene cloning and expression and factors for optimizing the heterologous gene expression.
CO 4	CO 4- The student will be acquainted with the techniques required for gainful applications of genetic engineering.
CO 5	The student will be able to apply RDT in different domains of life science, medical, agriculture, forensic and allied fields for the welfare of living beings.

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Course: Microbial Technology

Course Outcomes	Statement
CO 1	Explain the role of microorganisms in industrial, environmental, agricultural, and healthcare applications.
CO 2	Describe the principles and techniques of microbial biotechnology, including fermentation, genetic engineering, and bioinformatics.
CO 3	Analyze the applications of microbial enzymes, biofuels, biopolymers, and other bioproducts in various industries

Course: Bio-Analytical Tools

Course Outcomes	Statement
CO 1	Students will learn about the different bio-analytical techniques.
CO 2	Students will be able to use critical thinking skills to trouble shoot problems as they occur and determine possible causes.
CO 3	Students will be able to apply the knowledge of bio analytical techniques to the most commonly performed laboratory practices.

Course: Food and Dairy Microbiology

Course Outcomes	Statement
CO 1	Learn and understand the microbial spoilage of food.
CO 2	Understand the principles and methods of food preservation.
CO 3	Understand the fermented foods and food borne diseases.

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Course: Palentology

Course Outcomes	Statement
CO 1	Demonstrate an understanding of the fundamental principles and concepts of paleontology, including fossil formation, fossilization processes, and the history of life on Earth.
CO 2	Describe the major events in the history of life, including the evolution and extinction of organisms, using evidence from the fossil record.
CO 3	Understand and explain the role of paleontology in reconstructing past climates, ecosystems, and evolutionary processes.

Course: General Proficiency

Course Outcomes	Statement
CO 1	Effective communication: The ability to exchange ideas and information in a way that builds trust and respect.
CO 2	Critical and analytical thinking: The ability to explore issues and ideas before forming a conclusion.
CO 3	Integrative thinking: The ability to synthesize knowledge across different domains and perspectives.
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Course Outcomes (COs)
6th Semester

Course: Microbiological Analysis of Air and Water

Course Outcomes	Statement
CO 1	Students will become familiar with aero microbiology.
CO 2	Students will be able to learn the collection of air sample and its analysis.
CO 3	Students will be familiarized with the water microbiology and control measures.
CO 4	Students will be able to explain the microbiological analysis of water.

Course: Hospital Management

Course Outcomes	Statement
CO 1	Demonstrate a comprehensive understanding of the healthcare system, hospital operations, and the role of hospital management in the delivery of quality healthcare services.
CO 2	Understand key concepts in healthcare management such as hospital organization, patient care management, healthcare policies, and legal and ethical aspects of hospital administration.
CO 3	Explain the various functional areas of hospital management, including finance, human resources, marketing, information systems, and logistics, and how they contribute to the overall effectiveness of the institution.
CO 4	Apply analytical tools and management techniques to solve operational, financial, and strategic issues in hospital management.
CO 5	Use healthcare data to analyze hospital performance, improve decision-making, and develop strategies to optimize hospital operations and patient care services.

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Course: Soil and Water Microbiology

Course Outcomes	Statement
CO 1	Demonstrate a comprehensive understanding of the types of microorganisms (bacteria, fungi, protozoa, algae, viruses) present in soil and water ecosystems.
CO 2	Identify the different microbial communities in diverse soil and water environments and their role in ecosystem functioning.
CO 3	Explain the fundamental microbial processes involved in nutrient cycling in soil and water (e.g., nitrogen fixation, carbon cycling, and phosphorus solubilization).
CO 4	Analyze the role of microorganisms in the biogeochemical cycles (nitrogen, carbon, sulfur, phosphorus) in soil and water ecosystems.

Course: Marine Microbiology

Course Outcomes	Statement
CO 1	The student will be able to understand marine environment.
CO 2	The student will be able to know the methods of marine microbiology.
CO 3	The student will be able to know role of microbes in ocean processes.
CO 4	The students will be able to know recent trends in marine microbiology.

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Course: Vetinary Sciences

Course Outcomes	Statement
CO 1	Understand the anatomy, physiology, and pathology of animals and the role of the veterinarian in maintaining animal health.
CO 2	Develop skills in diagnosing and treating common and complex diseases in animals, using appropriate diagnostic and therapeutic methods.
CO 3	Gain proficiency in performing routine and emergency surgeries, managing post-operative care, and applying advanced surgical techniques.

Course: Biodiversity

Course Outcomes	Statement
CO 1	Demonstrate an understanding of the different levels and types of biodiversity (species, genetic, and ecosystem diversity).
CO 2	Analyze biodiversity using various methods and indices, including species richness, evenness, and diversity indices.
CO 3	Critically assess the impact of human activities on biodiversity, including habitat destruction, climate change, and overexploitation.

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Course: Bioinformatics

Course Outcomes	Statement
CO 1	Students will be able to understand basics of internet and computers along with information on various databases.
CO 2	Students will be able to understand application of bioinformatics in biotechnology.
CO 3	Students will be able to understand sequence alignment and various algorithms for it.
CO 4	Students will be able to understand and interpret sequence annotation and its retrieval.
CO 5	The information about various biologically important databases will be made available to students.

Course: Developmental biology and embryology

Course Outcomes	Statement
CO 1	Describe the key events in the development of organisms, from fertilization to adulthood, including cellular division, differentiation, and morphogenesis.
CO 2	Understand the molecular and genetic basis of development, including gene expression regulation, transcription factors, signaling pathways, and the role of master regulators in cell differentiation.
CO 3	Explain the processes of fertilization, cleavage, gastrulation, and neurulation, and their importance in shaping the embryonic body plan.

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Course: Population biology

Course Outcomes	Statement
CO 1	Describe and analyze different population growth models (exponential and logistic) and their applicability in real-world scenarios.
CO 2	Apply Hardy-Weinberg equilibrium and understand the role of genetic drift, migration, mutation, and natural selection in shaping population genetics.
CO 3	Examine the interactions between species (competition, predation, and mutualism) and understand their impact on population size and distribution.

Course: Project/Dissertation

Course Outcomes	Statement
CO 1	Forty five days of Sixth Semester of the B.Sc. Curriculum is devoted to major project/field work.
CO 2	Students, with the help of their mentor and faculty colleagues will identify a lab in India & abroad for the research work.
CO 3	The student should stay for a minimum prescribed Semester period at the place of work.
CO 4	Students not staying for the prescribed period will be marked absent as per the University Rules.
CO 5	At the end of their project the students shall submit the dissertation as per the Guidelines prescribed below.

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Course: General Proficiency

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