

Pos, PSOs and Cos

Program: B.Sc. Biotechnology

Program Outcomes

After the program completion Science Graduates will be able to-

PO1. Knowledge and understanding: Apply knowledge of Chemistry, Biology and Biotechnology to the solution of fundamental science problems.

PO2. Practical Skills: Apply basic principles of various branches of Chemistry in designing and conduction of experiments for higher studies, projects and Industries.

PO3. Scientific Skills: Understand concepts of Biotechnology and Interdisciplinary skills in genetics, biochemistry, microbiology, immunology and molecular biology along with basic instrumental skills.

PO4. Fundamental Knowledge: Understand diverse aspects of Plant sciences; biodiversity, physiology, anatomy, embryology, physiology, metabolism and economic botany, to apply principles of Biotechnology on Plant system for Human welfare.

PO5. Recent Advancement: Critically analyze and interpret data through IT skills with exploration of Biological databases and apply tools of bioinformatics, Genomics, and Proteomics in various sectors of biotechnology including agriculture, health and industry.

PO6. Conduct investigations on complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.

PO7. Environment sustainability: Understand the problems and solutions for sustainability of environment through biotechnological approaches and renewable energy sources.

PO8. Intellectual Property Rights: Understand the importance of innovation and creation for economic, social and cultural benefits of individual as well as country.

PO9. Ethics: Apply ethical principles and commit to responsibilities towards society, nation and planet earth.

PO10. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO11. Communication Skills: Communicate effectively acquired knowledge to the community by all means; comprehend and write effective reports, design documentation, make effective presentations, give and receive clear instructions.

PO12. 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:

PSO1: Apply appropriate techniques, resources, and modern instruments and equipment for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.

PSO2: Understand the impact of the biodiversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PSO3: Apply various aspects of biotechnology for career building in academics, research and Industry.

Course	Course outcomes:- After completion of these courses students should be able to
Semester I	
13000401- Chemistry	CO1: recall basics of chemistry that are required for further understanding of chemistry. CO2: express various theories about atomic structure CO3: Interpret the role of chemical bonds in properties of compounds and isomerism. CO4: explain the functional group specific organic reactions
13003300- Biodiversity	CO1: describe the commonness as well as uniqueness existing among microorganisms and lower plants. CO2. classify these organisms in different groups CO3. explain the life cycle of these organisms and their interrelationships.

	CO4. compare life cycle, morphology, anatomy and reproduction of these organisms with an evolutionary link
1300390- Biotechnology and Human Welfare	CO1: express the basic concepts of Biotechnology; principles, tools and techniques. CO2: explain the Biotechnological approaches in agriculture (transgenic Plants), industrial (fermentation and downstream processing) and medical (Recombinant vaccines, gene therapy) fields. CO3: solve environmental problems through biotechnological methods. CO4: interpret the results of DNA fingerprinting for forensic cases.
99002200- Business Communication (AECC)	CO1: explain different modes of communication in Business. CO2: acquire skills in reading, writing, comprehension and communication, as also to use electronic media for business communication. CO3: provide an overview of the various business communication skills and groom students professionally.
13002700- Ability & Skill Enhancement I	CO1: understand the usage of Grammar in day to day life and improve their fluency and confidence while speaking English. CO2: write in English.
Semester II	
13000700- Chemistry II	CO1: explain about principles of thermodynamics CO2. describe the ionization process of weak acids CO3. compare different methods of reagent preparation CO4. know how to change state of energy
13007300- Plant Anatomy & Embryology	CO1: Classify the different type of plant tissue CO2: Make diagram of structure of root and leaf of monocot and dicot plants CO3: explain the scope & importance of Anatomy and Embryology CO4: discuss fertilization, endosperm and embryogeny process.

13005900- Biochemistry & Metabolism	CO1: classify the types of proteins, carbohydrates and fatty acids CO2: summarize the activity of different co enzymes CO3: interpret the different cycles of Carbohydrates Metabolism CO4: Prepare different buffers solution
99001900- Environmental Studies	CO1: describe the structure and function ecosystem CO2: explain the knowledge about environment and its conservation along with sustainable development. CO3: explain the different types of disasters and their management CO4: classify the different types pollution and theirs role in ecosystem
13002800- Ability and Skill Enhancement II	CO1: select the correct phonetic symbols for improving language CO2: operate reading and writing skills in English CO3: prepare listening and speaking skills in English CO4: focus in understanding the ethics, virtues and values
Semester III	
13001300- Chemistry III	CO1: visualize the Diagrams which are important to materials engineering (specially in alloys). CO2: write about the details of ionic product of water, solubility product, degree of dissociation of electrolytes and performing the different types of titrations CO3: deduce the estimation the thermodynamics of electrochemistry, the structure of the electrode/electrolyte interface and electrode processes. CO4: express the principles, preparation and reactions mechanism associated with carboxylic functional groups, structures of biomolecules like carbohydrates and proteins, preparation of noble merrifield resin through peptide synthesis which has many research importance etc

13008700- Plant Physiology and Metabolism	<p>CO1: explain the mechanism of plant water relation i.e. Transpiration, Root pressure and guttation.</p> <p>CO2: discuss and compare the mechanism of photosynthesis and Respiration in Plants.</p> <p>CO3: explain and classify the different types of plant growth regulators</p> <p>CO4: conclude the response of light and temperature on plant growth</p>
13007700- Genetics	<p>CO1: express the mechanism of mode of inheritance through Mendelian and Non-Mendelian modes of inheritance that govern passage of genetic traits across generation and to apply this knowledge of inheritance to track alleles through generations</p> <p>CO2: discuss about the genetic organization of prokaryotic and viral genome and also classify the different types of genetic organisation of hereditary disorder patient</p> <p>CO3: classify the process the cell division i.e., mitosis and meiosis</p> <p>CO4: interpret the demonstration of - Barr Body -Rhoeo translocation.</p>
13028300-Basic Instrumentation Skills for Biotech	<p>CO1: recite the basic knowledge of instruments in biotechnology laboratory</p> <p>CO2: conclude the basic concept of pH and pH meter</p> <p>CO3: establish the knowledge how autoradiography is used in Biotechnology</p> <p>CO4: evaluate the use of chromatography and electrophoresis</p>
13002900- Ability & Skill Enhancement III	<p>CO1: classify the different types of reviews i.e. book review, movie review etc.</p> <p>CO2: express his/ her feeling at pressor situation or emotional situation</p> <p>CO3: explain his/her thoughts in group discussion and also build leadership quality</p> <p>CO4: enhance creativity in making documentary etc.</p>
Semester IV	

13002000- Chemistry- IV	<p>CO1: explain Valence Bond Theory and IUPAC nomenclature system</p> <p>CO2: discuss about transition elements, coordination chemistry, Crystal field theory etc.</p> <p>CO3: evaluate the chemistry of Solids, Liquids, Gases and Chemical Kinetics</p> <p>CO4: estimate the amount of nickel present in a given solution</p>
13015000- Environmental Biotechnology	<p>CO1: conclude the degradation of lignin, cellulose, pesticides and other toxic chemicals by micro-organisms</p> <p>CO2: explain the process of degradation of lignine and cellulose</p> <p>CO3: discuss the significance of genetically modified microbes, plants and animals.</p> <p>CO4: understand the biotic component of environment and their impact in enriching soil.</p>
13009100- Molecular Biology	<p>CO1: discuss the molecular architecture of eukaryotic cells and organelles, including membrane structure and dynamics</p> <p>CO2: compare and contrast the mechanisms of bacterial and eukaryotic DNA replication, DNA repair, transcription, and translation</p> <p>CO3: explain how DNA topology and chromatin structure affects the processes of DNA replication, repair, and transcription</p> <p>CO4: describe mechanisms by which DNA can be damaged and describe the molecular mechanisms by which protein complexes repair different forms of DNA damage</p>
13014500- Renewable Energy and Energy Harvesting	<p>CO1: Discuss about the different types of energy like Fossil fuels, Nuclear Energy, Ocean Thermal Energy Conversion and solar energy.</p> <p>CO2: compare and aware of generating energy via various technologies apart from the conventional methods</p> <p>CO3: express about Geothermal Resources and Geothermal Technologies</p> <p>CO4: explain about the environmental issues and renewable sources of energy, sustainability.</p>

13003000- Ability & Skill Enhancement - IV	<p>CO1: design the resume and know about different format</p> <p>CO2: know and classify the different types of interviews i.e. Mock Interview, HR Expert Mock Interview, Telephonic Interviews.</p> <p>CO3: examine the Company Specific Research and Presentation.</p> <p>CO4: build conversation skill</p>
Semester V	
13007000- Chemistry of Main Group Elements, Theories of Acids and Bases	<p>CO1: explain the concept of acids and bases and its application in whole chemistry</p> <p>CO2: describe the thermodynamic concept of extraction process and various extraction process involved in the elements.</p> <p>CO3: classify various periodic properties of the s and p block elements of the periodic table</p> <p>CO4: understand the preparation, properties and structure of some inorganic polymers which are of industrial importance.</p>
13011500- Immunology	<p>CO1: explain the about the basic concept, principle and components of immunity</p> <p>CO2: recognize the about the components of immune system and their function</p> <p>CO3: Express the Basic properties of antigens, B and T cell epitopes, haptens and adjuvants.</p> <p>CO4: Explain about the allergic reactions</p>
13011900- : Bioinformatics	<p>CO1: explain the concepts of bioinformatics and familiarize the students with the subject</p> <p>CO2: explain about Restriction Digestion, Chromatograms, Blots, PCR, Microarrays, Mass Spectrometry processes.</p> <p>CO3: Express how to deliver descriptions of this rapidly evolving field, and facilitate user access to and manipulation of the biological data and</p>

	<p>include descriptions of genetic and biological databases and relevant tools available to retrieve and analyze the information within these.</p> <p>CO4: learn about Sequence Information Sources, EMBL, GENBANK, Entrez, Unigene</p>
13012100- Biological Databases and their Management	<p>CO1: discuss about the important public data banks that provide details of biological systems and components along with a wide range of topics including open resources in Bioinformatics.</p> <p>CO2: learn about computational sequence analysis, sequence homology searching, gene finding and genome annotation, protein structure analysis and prediction, genomics, proteomics, phylogenetic analysis, biological databases etc.</p> <p>CO3: explain database system technologies; design, concurrency, security and backup/recovery issues of database management systems</p> <p>CO4: express about structure of databases and different types of databases</p>
13010000- Applications of IT Skills	<p>CO1: know and express expressions statements, compound statements, arithmetic, operators, unary operators, relational and logical operators,</p> <p>CO2: provide exposure to problem-solving through programming.</p> <p>CO3: express the basic concepts of the C-programming language</p> <p>CO4: employ a lab component which is designed to give the student hands- on experience with the concepts.</p>
13003100- Ability & Skill Enhancement - V	<p>CO1: express and build leadership quality</p> <p>CO2: Recall the traits of Successful Entrepreneurs, and Entrepreneurial qualities</p> <p>CO3: classify the differences between organizational decision making process, entrepreneurial decision making process</p> <p>CO4: creat work related skills and prepare effective interview questions to conduct effective interviews.</p>
Semester VI	

13009700- Organometallics, Bioinorganic Chemistry, Polynuclear, Hydrocarbons and UV, IR Spectroscopy	<p>CO1: interpret the core inorganic chemistry</p> <p>CO2: express the concept of the preparation, structure and bonding in organometallic compounds</p> <p>CO3: explain the functions of various ions like sodium, potassium, magnesium and calcium in our body.</p> <p>CO4: learn the concept of uv-visible and infra-red spectroscopy with the help of which we can determine the structure of the unknown organic compounds</p>
13014800- Economic Botany and Biotechnology	<p>CO1: describe the centers of origin of various economically important crops</p> <p>CO2: discuss about the basic concepts in Biotechnology</p> <p>CO3: understand the basic technique of plant tissue culture</p> <p>CO4: express about of modern techniques and tools used in biotechnology.</p>
13015400- Genomics & Proteomics	<p>CO1: describe the recent developments in genetics, epigenetics, small RNAs, proteomics, gene expression, mutagenesis and mapping genes</p> <p>CO2: conclude the different mechanism like signal transduction, regulation of transcription and translation, cancer, aging, drought stress and metabolic pathways.</p> <p>CO3: provide the knowledge and practical skills associated with functional genomics and proteomics.</p> <p>CO4: discuss on pharmacogenomics and the implications of applying 'personalized medicine' in human health.</p>
13015600- : Intellectual Property Rights	<p>CO1: describe about the importance and types of Intellectual Property</p> <p>CO2: express about the Different International agreements like General Agreement on Tariffs & Trade (GATT), Trade Related Intellectual Property Rights (TRIPS) agreement, General Agreement on Trade related Services (GATS), Madrid Protocol, Berne Convention, Budapest Treaty etc.</p> <p>CO3: learn about role of Judiciary and role of law enforcement agencies.</p>

	CO4: explain various laws in India for licensing and technology transfer.
13003200- Ability and Skill Enhancement - VI	CO1: learn about verbal reasoning & English aptitude CO2: develop a winning attitude CO3: learn the ways to understand news and be a journalist. CO4: learn the ability to prepare reports on major national and international news.