ST. ALOYSIUS' COLLEGE

AUTONOMOUS

JABALPUR- 482001

MADHYA PRADESH, INDIA

CRITERION-1

CURRICULAR ASPECTS

Key Indicator – 1.1

Curriculum Design and Development

Metric No.: 1.1.1

Curricula have relevance to the Local, Regional, National and Global developmental needs which is reflected in Programme outcomes (POs), Programme Specific outcomes (PSOs) and Course Outcomes (COs) of the Programmes offered by the Institution

Document Name

Mapping Faculty of Bio-Science

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Faculty of Biosciences

Program Outcomes

Bachelor of Science (B.Sc.)

PO No.	Programme Specific Outcomes After successfully completing B. Sc. (Bioscience) Programme students will be able to:
PO-1	Develop a scientific temper and research culture to address national and global environmental and sustainability issues.
PO-2	Conduct basic scientific research and provide inputs for societal benefits. Communicate scientific information through effective formal and informal methods generally used in sciences.
PO-3	Develop competence in basic sciences and in the content of the specific courses thatconstitute the principal knowledge of their degree.
PO-4	As Bioscience is an interdisciplinary course, empower the students to acquire technological knowledge by connecting disciplinary and interdisciplinary aspects of Bioscience

PO-5	To cultivate a profound practical understanding among bioscience students tailored to our local region's requirements, empowering them for effective utilization in both industry and research endeavors.
PO-6	Acquire the skills in handling scientific instruments, planning and performing in laboratoryexperiments.
PO-7	Understand and be aware of relevant theories, paradigms, concepts, and principles ofBioscience.
PO-8	Fostering an understanding of local evolutionary strategies to identify and study indigenous flora and fauna, instilling a passion for biodiversity conservation tailored to our regional context.
PO-9	Develop an understanding of various aspects of physical chemistry, structural properties of organic and inorganic forms, elucidation of electronic configuration and their applications.
PO-10	Conceptual learning of the microbial world and microbiological techniques, industrially important microorganisms, structure and functions of biomolecules, and basic knowledge of immune system and immunological techniques.

Faculty of BioSciences

Program Specific Outcomes

B.Sc. (Major-Minor-Electives) – Botany

After the successful completion of the three-year B.Sc. (MME) Programme, the graduate will be able to:

PSO No.	Programme Specific Outcomes Upon completion of these courses, the student would
PSO-1	Provide a basic understanding in Botany for undergraduate degree courses and auxiliary higher education.
PSO-2	Attain essential knowledge and skills for a career as botanist, mainly as Ecologist, Nursery or Green House manager, Geneticist, Paleo botanistand Farming Consultant.
PSO-3	Develop skills for diverse botanical techniques, considering and incorporating local regional needs to enhance interest and relevance in the field of botany.
PSO-4	Discover the diversity of plants, their evolutionary process, economic importance, significance, and relationship with Human beings.
PSO-5	Gain foundational skills for utilizing local plants and their components across various industries, addressing specific needs and opportunities within our region.
PSO-6	Acquire basic knowledge and skills through practical botany.
PSO-7	Impart knowledge of predominant microbial diseases of plants and Humans.
PSO-8	Learn basic skills to establish a startup and become self-reliant.

B.Sc. (Major-Minor-Electives)

Industrial Microbiology

After the successful completion of the three-year B.Sc. (MME) Programme, the graduate will be able to:

PSO No.	Programme Specific Outcomes Upon completion of these courses, the student would
PSO-1	Provide a basic understanding in Microbiology for both a graduation Degree course and further higher studies.
PSO-2	Acquire fundamental knowledge and skills for a career in microbiology, particularly industrial microbiology.
PSO-3	Inculcate interest in tools and techniques used in Life Sciences.
PSO-4	Discover the unity of life through the rich diversity of microorganisms and their ecological importance.
PSO-5	Acquire basic skills for the utilization of microbes for human welfare.
PSO-6	Learn basic skills in the observation and study of nature, biological techniques, practical skills and research.
PSO-7	Attain fundamental knowledge and practical skills in locally relevant applied branches, empowering individuals for self-employment opportunities tailored to our regional context.
PSO-8	Impart awareness about the conservation of the biosphere.

Bachelor of Science (B.Sc. – Zoology)

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	Demonstrate a fundamental understanding of the academic field of Zoology, its different learning areas and applications.
PSO-2	Learn about the important taxonomy and phylogeny to get a concrete idea of evolution of Non Chordata phyla.
PSO-3	Exhibit Skills in areas related to their individual specialization like Assisted reproductive technique
PSO-4	Contributes the knowledge for Nation building.
PSO-5	Understand the ideas and principles of biochemistry, immunology, physiology, ethology, endocrinology, developmental biology, cell biology, genetics, and molecular biology.
PSO-6	Understand the environmental conservation processes and its importance, pollution control, protection of endangered species, Wildlife Management, Climatic changes and Global Management.

Bachelor of Science (B.Sc) – Biotechnology

PSO No.	Programme Specific Outcomes Upon completion of these courses, the student would
PSO-1	As Biotechnology is an interdisciplinary course, empower the students to acquire technological knowledge by connecting disciplinary and interdisciplinary aspects of biotechnology.
PSO-2	To gain comprehensive practical expertise among biotechnology students, emphasizing applications pertinent to our regional industries and research landscape.
PSO-3	To develop scientific temperament and professional ethics in the students.
PSO-4	To Inculcate reading, presenting, verbal, teamwork and communication skills among the biotechnology students.

Bachelor of Science (B.Sc) – Chemistry

PSO No.	Programme Specific Outcomes Upon completion of these courses, the student would
PSO-1	Disciplinary knowledge and understanding of fundamentals and principles of Chemistry and allied subjects.
PSO-2	To develop concepts of wide range of organic, inorganic, physical, analytical and spectroscopic techniques in chemistry.
PSO-3	To develop basic professional skills in specific areas in Chemistry such as spectral analysis, inorganic and organic synthesis, estimation and characterization, physical practical data evaluation and formulation of resultthrough proper calculations and hands on experience of usage of instruments like spectrophotometer, conductivity bridge, polarimeter, CRO and others.
PSO-4	To promote team work and time management in organizing and working in a chemistry laboratory.
PSO-5	To promote experiential learning by carrying out laboratory oriented chemistry practicals such as synthesis of complexes, inorganic and organic mixture analysis, gravimetric analysis, spectroscopic techniques and others.
PSO-6	Adopt the principles of the 3 R's - Reduce, Recycle, and Reuse, while advocating for the implementation of the 12 principles of Green Chemistry in laboratories, ensuring alignment with global, national, and local/regional sustainability goals and requirements.
PSO-7	Promote awareness and utilization of biodegradable, cost-effective, environmentally friendly, and green chemicals and processes, tailored to address local regional needs and priorities
PSO-8	To minimize the use of chemicals and reduce the environmental pollution

Faculty of Bioscience

Course Outcomes

Bachelor of Science (BSc)

Subject: Zoology

B.Sc. I Sem (Major/Minor/Elective)

Paper- I: Animal Diversity: Non-Chordata

CO No.	Course Outcomes	Cognitive Level
CO-1	Learn about the importance of systemic, taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla.	An
CO-2	Describe general taxonomic rules on animal classification at global level.	U
CO-3	Acquire understanding of the economic, ecological, and medical importance of diverse animal species in advancing human welfare, considering and addressing global, national, and local/regional needs and contexts.	An
CO-4	Understand the important parasites and their control measures.	U
CO-5	Understand the Evolutionary significance of Larval forms of Echinodermata & Hemichordata.	U

B.Sc. II Sem (Major/Minor/Elective)

Cell Biology, Reproductive biology, and developmental biology

CO No.	Course Outcomes	Cognitive Level
CO-1	Develop a deeper understanding of what life is and how it functions at the cellular level	U
CO-2	Understand the nature and basic concepts of Cell Biology,Reproductive and Developmental biology.	U
CO-3	Understand the structure and functions of cell membrane and cellular organelles	U
CO-4	Understand the importance of the latest reproductive trends, and reproductivetechniques to be applied for human welfare.	App
CO-5	Understand the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to the establishment of body plan of multi-cellular organisms.	An

B.Sc. II Year (Major)

Paper- I: Diversity of Chordates and Comparative Anatomy

CO No.	Course Outcomes	Cognitive Level
CO-1	Understand chordate diversity of animals and theirtaxonomic positions.	U
CO-2	Enhance the understanding of local resource utilization, livestock, fish farming products and its marketing as per National/Global standards. Identify the morphological and anatomical features and basis of chordate classification.	R
CO-3	Understand the global, national, and local/regional economic importance and current status of biodiversity to foster a positive attitude towards its conservation.	An
CO-4	Differentiate the organism belonging to different taxa, by studying comparative anatomy.	U
CO-5	The project, assignment will give them a flavor of research in studying biodiversity, and taxonomy besides improving their writing skills and lay foundation of a career in Zoology	Apply

B.Sc. II Year (Major Paper II/Minor/Elective)

Physiology and Biochemistry

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to how organs function at different levels i.e. from cellular to system levels.	U
CO-2	Examine internal harmony of different body systems by Learning inherent disorders and deficiencies, which is needed tomaintain good health.	U
CO-3	Understand functions of biomolecules & their role inmetabolism by studying biochemistry.	App
CO-4	Develop a strong foundation for research & employability skills.	App
CO-5	Improve the student's perspective of health biologythrough deep study of physiology	An

BSc. Semester I

Course Outcome

Paper: Cell Biology and Chemistry

CO No.	Course Outcomes
CO-1	Understand the basics of cell biology.
CO-2	Appreciate the importance of bonding and spatial arrangements of molecules for proper functioning andstability.
CO-3	Understand both the physical as well as chemical properties of biomolecules.
CO-4	Students can also go in for medical Laboratory Technique Courses, opening opportunities in hospitalsand pathological laboratories.

B.Sc. Semester II

Paper: Microbiology and Immunology

CO No.	Course Outcomes
CO-1	Students will be able to understand the basics of Microbial diversity and nutrition.
CO-2	To expose the students towards the emerging world of the Immune system, its properties and types.
CO-3	Students will be able to understand Immunoglobulin structure, types and functions and can apply theconcept of hypersensitivity and vaccination for different diseases.
CO-4	To develop skills required in performing various microbial and immunological techniques.

B.Sc. II Year

Paper: Basic Molecular Biology

CO No.	Course Outcomes
CO-1	Students will be able to explain the role of different proteins/ enzymes involved in cell signaling.
CO-2	They will be able to understand the mechanism of genetic damage caused by mutation and the role of various repair systems in neglecting the effect of these mutations.
CO-3	Students will be able to explain the mechanism of DNA replication, transcription, translation, and other related processes

Paper II: Recombinant DNA Technology

CO No.	Course Outcomes
CO-1	The objectives of this course are to teach students with various approaches to conduct genetic engineering and their applications in biological research as well as in biotechnology industries.
CO-2	Genetic engineering is a technology that has been developed based on our fundamental understanding ofthe principles of molecular biology and this is reflected in the contents of this course.
CO-3	Given the impact of genetic engineering in modern society, the students should be endowed with strongtheoretical knowledge of this technology.
CO-4	In conjunction with the practical in molecular biology and genetic engineering, the students should beable to take up biological research as well as placement in the relevant biotech industry.

Bachelor of Science (B.Sc.)

Subject: Botany

B.Sc. I sem Minor/Elective (Applied Botany)

CO No.	Course Outcomes	Cognitive Level
CO-1	Apply principles of agriculture and scientific methods to enhance student's understanding of agricultural problems.	U, A
CO-2	Understand the significance and role of botany.	U,R
CO-3	Learn the basic aspects of applied botany.	R, U
CO-4	Students will be able to explore about employment opportunities in the field of botany.	A, C
CO-5	Understand the opportunities of social services.	A,C
CO-6	Students will be able to gain knowledge about best health practices.	U, A
CO-7	Students will be able to explore startup opportunities in field of botany.	A, C

B.Sc II sem Minor / Elective (Basic Botany)

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to understand the diversity of plants and the evolutionary process in plant kingdoms.	U, R
CO-2	Students will be able to understand an account of plant adaptations from aquatic conditions to colonize terrestrial habitats.	U, R
CO-3	Students will be able to explore the changes in morphological, anatomical, and reproductive structures that propel plant evolution.	U,R
CO-4	Students will comprehend the economic significance of plants in their natural environment, aligning with both national and global standards.	U,R
CO-5	Students will be able to get acquainted with locally prevalent microbial diseases of plants and humans.	U,R

B.Sc II year

Paper: Minor/Elective (Industrial Botany)

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to gain knowledge on plants and their parts used in various industries.	U, Ap
CO-2	Students will be able to get an idea to establish plant plant-based natural product industry.	U, C
CO-3	Students will be able to make the students self-reliant.	U,C,R

B.Sc. I Sem

Industrial Microbiology

Major: Tools and Techniques in Industrial Microbiology

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to understand the relevance of microscopic approaches in life sciences.	U,R
CO-2	Students will be able to develop skills to understand concept and applications of instruments used in life sciences.	Ap
CO-3	Students will be able to develop scientific understanding of analytical techniques.	U,R
CO-4	Students will be able to be able to interpret the results of an experiment.	A
CO-5	Students will be able to demonstrate use of different tools and different modern techniques in the field of Industrial Microbiology. Please rewrite with Global National local regional needs	U,R

B.Sc II sem

Industrial Microbiology

Major: (Fundamentals of Industrial Microbiology)

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to understand the history and development of Microbiology	R
CO-2	Students will be able to describe the role and significance of microorganisms in societal welfare.	Ap, R
CO-3	Students will be able to identify and classify the important microorganisms.	R
CO-4	Students will be able to discover the contributions of important scientists in the field.	R

B.Sc II year

Industrial Microbiology

Paper 1 Major : (Application of Industrial Microbiology)

CO No.	Course Outcomes	Cognitive Level
CO-1	Students will be able to understand working and design of a fermenter, its uses, and its different types.	U,R
CO-2	Students will be able to demonstrate the knowledge and understanding of basic fermentations processes.	U,A
CO-3	Students will gain the ability to identify industrially significant microbes for cost-effective utilization, tailored to meet global, national, and local/regional economic demands and opportunities.	A
CO-4	Students will be able to screen and identify organism of potential industrial importance	A
CO-5	Students will be able to describe various separation techniques and downstream processing different metabolites.	R

B.Sc II year

IMB

Paper 2 Major: (Physiology and Biochemistry of Microbes)

CO No.	Course Outcomes	Cognitive Level
CO-1	The students will be able to demonstrate a knowledge and understanding of the basics. Principle of biochemistry including important molecules and their economic and scientific importance insidethe cell.	U, R
CO-2	The students will be able to understand the biochemical pathways of synthesis and degradation of these molecules.	R
CO-3	The students will be able to classify various types of enzymes and explain enzyme kinetics.	R
CO-4	The students will be able to explain the transport of different metabolites generated, with application in industrial processes.	U, R
CO-5	The students will have comprehensive knowledge of microbial physiology and biochemistry.	R

Bachelor of Science (B.Sc.)

Subject: Chemistry

B.Sc. I Sem

Paper- I: Major/Minor (Fundamentals of Chemistry)

CO No.	Course Outcomes	Cognitive Level
CO-1	Gain a thorough knowledge about various theories and principles applied to reveal atomic structure and quantum number.	U, An
CO-2	Understand concepts of periodic properties of elements.	R, App
CO-3	Develop the Acid-Base concept and pH buffer.	U,App
CO-4	Gain a thorough knowledge about factors responsible for the reactivity of organic molecules.	An, Ev
CO-5	Develop an understanding related to basics and Mechanism of Chemical Kinetic	U, K

Paper- I: Elective (Fundamentals of Chemistry)

CO No.	Course Outcomes	Cognitive Level
CO-1	Gain a thorough knowledge about various theories and principles applied to reveal atomic structure and quantum number	U, An
CO-2	Understand concepts of periodic properties of elements.	R, App
CO-3	Develop the Acid-Base concept and pH buffer	U,App
CO-4	Gain a thorough knowledge about factors responsible for reactivity of organic molecules	An, Ev
CO-5	Develop an understanding related to basics and Mechanism of Chemical Kinetic	U, K

B.Sc. II Sem

Paper- II: Major/Minor/Elective (Analytical Chemistry)

CO No.	Course Outcomes	Cognitive Level
CO-1	Comprehend the fundamental applications of mathematics and computers in the field of chemistry, considering and adapting to global, national, and local/regional needs.	U, R
CO-2	Gain a thorough knowledge about the fundamentals of analytical chemistry and the steps involved in the analysis.	K, C, An
CO-3	Build the concepts of thermodynamics and chemical equilibrium.	App, An
CO-4	Develop an understanding about the principle of chromatography and spectroscopy and utilization of chromatographic and spectroscopic techniques in analysis.	R, Ev

B.Sc. II Year

Major/Minor/Elective

Paper-1

Paper- I: Reaction, reagent, and Mechanism in Organic Chemistry

CO No.	Course Outcomes	Cognitive Level
CO-1	Develop knowledge of various organic reactions, reagents and their mechanism in understanding organic synthesis	App, Ev
CO-2	Gain an understanding of the practical applications of reactions in diverse industries such as pharmaceuticals, polymers, pesticides, textiles, and dyes, tailored to meet global, national, and local/regional needs.	U, App
CO-3	Develop knowledge about important key reactions used in higher studies and research in chemistry	R, Ev
CO-4	Perform various reactions, which will be helpful in understanding organic synthesis.	R, App
CO-5	Understand the use reagents while performing experiments based on certain organic reactions	K, An
CO-6	Analyze and Synthesize some organic compounds	U, App

Faculty of Science

Program Outcomes

Bachelor of Science (B.Sc.)

PO No.	Program Outcomes After completion of the programme, the student is able to do:
PO-1	Analysis, investigation and synthesis of organic and inorganic compounds.
PO-2	Handling of instruments like spectrophotometer, CRO.
PO-3	Gain knowledge of various computer hardware components, including the purpose and functions of operating systems, and develop the skills to troubleshoot a variety of electronic equipment, addressing requirements at global, national, and local/regional levels.
PO-4	Apply the basics of various electronic components like diode, transistor, etc., graphical data analysis and interpretation, use of concepts of digital fundamentals, memory system, and various electronic components.
PO-5	Comprehend computer architecture, network, data structure, database management system and various web based and application-based programming languages.
PO-6	Apply interdisciplinary knowledge and skills to address complex scientific challenges, integrating global best practices with local and regional needs to contribute effectively to scientific advancements, industrial innovation, and sustainable development initiatives

Bachelor of Science (B.Sc.) Chemistry

PSO No.	Programme Specific Outcomes Upon completion of these courses, the student would
PSO-1	Disciplinary knowledge and understanding of fundamentals and principles of Chemistry and allied subjects.
PSO-2	To develop concepts of wide range of organic, inorganic, physical, analytical and spectroscopic techniques in chemistry.
PSO-3	To develop basic professional skills in specific areas in Chemistry such as spectral analysis, inorganic and organic synthesis, estimation and characterization, physical practical data evaluation and formulation of result through proper calculations and hands on experience of usage of instruments like spectrophotometer, conductivity bridge, polarimeter, CRO and others.
PSO-4	To promote team work and time management in organizing and working in a chemistry laboratory.
PSO-5	To promote experiential learning by carrying out laboratory oriented chemistry practical such as synthesis of complexes, inorganic and organic mixture analysis, gravimetric analysis, spectroscopic techniques and others.
PSO-6	Adopt the principles of the 3 R's - Reduce, Recycle, and Reuse, while advocating for the implementation of the 12 principles of Green Chemistry in laboratories, ensuring alignment with global, national, and local/regional sustainability goals and requirements.
PSO-7	Promote awareness and utilization of biodegradable, cost-effective, environmentally friendly, and green chemicals and processes, tailored to address local regional needs and priorities
PSO-8	To minimize the use of chemicals and reduce the environmental pollution caused by the department.

Bachelor of Science (B.Sc.)

Subject: Chemistry

B.Sc. I Sem

Paper- I: Major/Minor (Fundamentals of Chemistry)

CO No.	Course Outcomes	Cognitive Level
CO-1	Gain a thorough knowledge about various theories and principles applied to reveal atomic structure and quantum number	U, An
CO-2	Understand concepts of periodic properties of elements.	R, App
CO-3	Develop the Acid-Base concept and pH buffer	U,App
CO-4	Gain a thorough knowledge about factors responsible for reactivity of organic molecules	An, Ev
CO-5	Develop an understanding related to basics and Mechanism of Chemical Kinetic	U, K

Paper- I: Elective (Fundamentals of Chemistry)

CO No.	Course Outcomes	Cognitive Level
CO-1	Gain a thorough knowledge about various theories and principles applied to reveal atomic structure and quantum number	U, An
CO-2	Understand concepts of periodic properties of elements.	R, App
CO-3	Develop the Acid-Base concept and pH buffer	U,App
CO-4	Gain a thorough knowledge about factors responsible for reactivity of organic molecules	An, Ev

CO-5	Develop an understanding related to basics and Mechanism of Chemical Kinetic	U, K

B.Sc. II SEM

CO No.	Course Outcomes	Cognitive Level
CO-1	Comprehend the fundamental applications of mathematics and computers in the field of chemistry, considering and adapting to global, national, and local/regional needs.	**U, R**
CO-2	Gain a thorough knowledge about fundamentals of analytical chemistry and steps involved in analysis.	K, C, An
CO-3	Build the concepts of thermodynamics and chemical equilibrium	App, An
CO-4	Develop an understanding about principle of chromatography and spectroscopy and utilization of chromatographic and spectroscopic techniques in analysis	R, Ev

B.Sc. II Year

Major/Minor/Elective

Paper-1

Paper- I: Reaction, reagent and Mechanism in Organic Chemistry

CO No.	Course Outcomes	Cognitive Level
CO-1	Develop knowledge of various organic reactions, reagents and their mechanism in understanding organic synthesis	App, Ev
CO-2	Gain an understanding of the practical applications of reactions in diverse industries such as pharmaceuticals, polymers, pesticides, textiles, and dyes, tailored to meet global, national, and local/regional needs.	U, App
CO-3	Develop knowledge about important key reactions used in higher studies and research in chemistry	R, Ev
CO-4	Perform various reactions, which will be helpful in understanding organic synthesis.	R, App
CO-5	Understand the use reagents while performing experiments based on certain organic reactions	K, An
CO-6	Analyze and Synthesize some organic compounds	U, App

B.Sc. II Year

Major/Minor/Elective (Theory)

Paper 2: Transition Elements, Energetic, Phase equilibrium

CO No.	Course Outcomes	Cognitive Level
CO-1	Develop an understanding about traditional Indian Chemistry	R, Un
CO-2	Understand the concepts of chemistry of d & f block elements, basic concepts of coordination chemistry.	App, U
CO-3	Explain Stereochemistry of transition metal complexes.	R, An
CO-4	Gain a thorough knowledge about Laws of thermodynamics and thermochemistry	K, Un
CO-5	Develop the concept of phase equilibrium with reference to solid solution, liquid-liquid mixture, partially miscible liquids.	App, C
CO-6	Develop an understanding about basic concepts of electrochemistry, various types of electrodes and their reactions.	Un, C