

Program outcomes, program specific outcomes and course outcomes for all programs offered by the institution are stated and displayed on website and communicated to teachers and students.

Post Graduate Course

After completion of M. Sc in Chemistry

- a) The students will have clear understanding about the major concepts of all disciplines of chemistry.**
- b) The students will be able to analyse data obtained from sophisticated instruments (like UV-VIS, Fluorescence, FTIR, NMR, GCMS, HPLC etc.) for structure determination and chemical analysis.**
- c) The students will be able to apply Green Chemistry techniques towards planning and execution of research in the frontier areas of chemical sciences like synthesis of natural products and drugs.**
- d) The students will be able to create an awareness about the importance of chemistry in the society outside scientific community.**
- e) The students will be able to study medicinal chemistry for development of new generation drugs.**
- f) The students may pursue career in Forensic chemistry and forensic toxicology. A forensic chemist can assist in the identification of unknown materials found at a crime scene.**
- g) The students may do research for development of new flavors, natural and artificial preservatives, sweeteners for food industry.**

After completion of M. Sc in Botany, the students will be aware of

- a) Concept, process, physiology and molecular basis of plant development.**
- b) Finding newer and more productive methods of cultivation of millets, leguminous plants, fruits, essential oils, vegetables etc.**
- c) Economic importance of different algae, their cultivation and applications.**
- d) Application of bio-pesticides; sources, methods and production of bio-fuel.**
- e) Fermentation technology.**
- f) Biostatistics and bioinformatics.**

BOTANY

Programme specific outcome

M Sc Botany curriculum targets to motivate and brace the gradual demands and challenging trends in the global educational system. The M. Sc. Botany syllabus is designed to equip students with subject domain knowledge, simultaneously introducing the concepts of breadth and depth in learning.

- It aims to train the students in all the areas of plant sciences with a unique combination of core and elective papers with significant interdisciplinary components as per CBCS.
- Students have exposure to cutting-edge technologies that are currently used in the subject. They are made aware about the social and environmental issues, significance of plants and their relevance to the national economy.
- The courses have been designed to benefit all Botany students to study various aspects of plant science including its practical applications. Keeping in mind that these students can take up teaching at different levels, research work in research institutes and or industry, doctoral work, environment impact assessment, biodiversity studies, entrepreneurship, scientific writing relevant topics have been included in the curriculum.
- The students create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.
- Last and not the least to prepare the students for lifelong learning by drawing attention to the vast world of knowledge of plants and introducing them to the methodology of systematic academic enquiry.

Course specific outcome

The postgraduate course has been semesterized since 2018. Each course has theoretical and practical papers.

Semester 1

In Semester 1 there are 4 courses namely Microbiology (C 11), Phycology (C 12), Bryophytes, Pteridophytes and Gymnosperms (C 13) and Cell Biology (C 14). In this course the students critically evaluate informations related to cryptograms, and recognize the position of plant in the broad classification and phylogenetic level. The students develop understanding about the diversity, identification, classification and economic importance of lower plants. The course will increase the knowledge of the students about the classification, structure, role and genetics of microbes. This semester also deals with cellular details, cell organelle and their functions at molecular level, prokaryotic and eukaryotic genome-structure, gene function and regulation, epigenetics, cytogenetics and crop evolution. The students have a hand on experience

dealing with sophisticated instruments like fluorescence microscope, UV spectroscopy, ultra centrifuge and also learns modern techniques like ELISA, SDS- PAGE.

Semester 2

In this semester there are 4 courses namely Palaeobotany and Palynology (C 21), Taxonomy of Angiosperms (C 22), Phytochemistry and Pharmacognosy (C 23) and Genetics and Genomics (C 24). Here the students not only learn about the scope of Paleobotany, types of fossils, its role in global economy and geological time scale but also understands the various fossil genera representing different fossil groups. The students learn about techniques in fossil preservation and also perform acetolysis method for pollen recovery from honey. This course also aims to add to understanding of the students about the diversity of plants, their description, identification, nomenclature and their classification including recent advances in the field. A long excursion and several local excursions are conducted by the department which focuses on identification of the flora in field and also to study the biodiversity in relation to habitat correlating with climate change, land and forest degradation. This course would provide students with an understanding of principles and techniques of quantitative and evolutionary genetics coupled with functional genomics and proteomics too. The students also learn about phytochemistry and its importance to human welfare.

Semester 3

This semester comprises of 2 courses namely Mycology and Plant pathology (C 31), Plant Physiology and Biochemistry (C 32). In this course the students are also allowed to choose any one optional paper mentioned in their curriculum. In addition, the students are also offered 2 CBCS papers of their choice mentioned in the syllabus. This course aims to educate student about the mechanism and physiology life processes in plants. They will also gain about the various uptake and transport mechanisms in plants and are able to coordinate the various processes. They understand the role of various hormones, signaling compounds, thermodynamics and enzyme kinetics. During the course students will gain knowledge about various mechanisms such as channel or transport proteins involved in nutrient uptake in plants. The course will increase the understanding of the students about the classification, structure, role and infectious cycle of Fungi. They also learn about fungal genetics, host pathogen interaction. The students perform various plant physiology experiments establishing different life processes in plants. They also learn different mycological techniques related to mushroom culture, fungal tissue culture, and genomic DNA isolation from fungi and so on. The students are also supposed to do a project work on any 1 aspect of botany of their choice and are supposed to deliver a lecture and submit a report on it.

Semester 4

In Semester 4 three courses are offered namely Plant Anatomy and Developmental Biology (C 41) Plant Biotechnology (C 42) and Ecology (C 43). In addition the students are also allowed to

choose any one optional paper from the curriculum. This course aims at making the students acquainted with the fundamentals and present understanding of the mechanisms associated with development, differentiation and structure of various plant organs, the metabolic and physiological changes occurring in them. The students will also learn about concepts, tools and techniques related to *in vitro* propagation of plants, *Agrobacterium* mediated plant transformation technique and also get an idea about the principles and methods used for phenotypic, genetic and molecular analysis of transgenic plants. The students get a clear concept on principles of ecology, biological diversity, conservation, sustainable development, population, community and ecosystem structure and function, application of these concepts to solve environmental problems.

In third semester students have to study two subjects other than the parent subject viz. Human Genetics, Plant biochemistry, Concepts in Zoological Science, Fundamentals of Bacteriology etc. In third and fourth semesters students have to opt for one optional paper such as Applied virology, Advanced Cell Biology, Plant Molecular Biology, Immunology etc. These subjects help the students to get preparation in the competitive exams such as NET/ GATE/ SET etc. The students have to carry out the dissertation work during third and fourth semesters. The dissertation work helps the students to have a research exposure which will be beneficial for those who will join the Ph.D. programme in future.

CHEMISTRY

Programme Specific Outcome

PSO1. Students develop a holistic knowledge in the undergraduate course starting from atomic structure, physical and chemical properties of materials, stereochemistry of the molecules, laws of thermodynamics and quantum theory, spectroscopy and reaction mechanism.

PSO2. In practical classes students work out the synthesis of complexes, qualitative and quantitative estimations, physico-chemical experiments for the determination of rate of the reactions, etc that helps a student a very efficient synthetic chemist.

PSO3. Final semester project work helps the students to develop knowledge about the current research and explore the field of interest.

PSO4. Students build up awareness and knowledge in environmental related issues such as waste management, pollution monitoring, recycling, etc.

PSO5. Students after passing post graduate course can explore in various field of research viz. basic and advance Inorganic, Organic and Physical Chemistry, Material Science, Nanoscience, Biochemistry, etc.

PSO6. Students of PG course get the chance to have an exposure in elective courses such as Biochemistry, applied mathematics etc. This will open up new paths of the interdisciplinary research and job opportunities for the students.

PSO7. The students of Post Graduate Department get a hands-on experience in Research during carrying out dissertation work. This helps the students to have research exposure which will be beneficial for those who will join the Ph.D. programme in future.

PSO8. The contents of core course and optional courses in PG curriculum are beneficial for the students to get prepared for NET, GATE, GRE and other job oriented competitive examinations.

Course outcomes

CO1. Basic and advance understanding of bonding, physical properties, stereochemistry and reaction mechanism in organic molecules.

CO2. Advance understanding of reactions in unsaturated, carbonyl and associated compounds and organometallics.

CO3. Study nitrogenous compounds, rearrangement reactions and logical synthesis of organic molecules and analyze of organic compounds using molecular spectroscopy.

CO4. Basic and advance study of carbocycles, heterocycles, pericyclic reactions, carbohydrate and biomolecules.

CO5. Analyze of solid binary mixtures; determine boiling points of organic liquid samples; prepare small scale organic compounds; identify pure solid and liquid samples, Separate organic mixture in chromatographic method and analyzes organic compounds by spectroscopy.

CO6. Understand atomic structure, radioactivity, periodic properties, acid base reactions and chemical bonding, structure and properties of covalent compound, structure, defects and properties and chemical forces of ionic and non-ionic crystalline solids.

CO8. Understand and preparation, bonding, structure and properties and reactions of compounds of s, p, d and f block elements and study organometallic and coordination compounds and bioinorganic chemistry

CO9. Understand principles of separation techniques, quantitative estimation of metal ion single or present in a mixture, ore and mineral analysis, spectroscopic techniques.

CO10. Understand properties of ideal gases; speed, kinetic energy heat capacity, real gases, intermolecular forces, liquefaction.

CO11. Understand basic principle of thermodynamics, thermochemistry, equilibrium, colligative properties, phase rule and statistical thermodynamics.

- CO12. Understand properties of liquid; viscosity and surface tension.
- CO13. Understand principle of quantum mechanics and analyze related phenomenon, study quantum mechanical model and analyze molecular spectroscopy.
- CO14. Understand and determine physical properties like surface tension, viscosity, partition coefficient, rate constant of a reaction, etc.
- CO15. Understand of Nano chemistry, supramolecular chemistry, Density Functional Theory (DFT).