

Program Outcome, Program Specific Outcome and Course Outcome for B.Sc. (Hons) Botany

The curriculum of B.Sc. (Hons) Botany offer essential knowledge and technical skills to study plants in a holistic approach. Students would be educated in all areas of plant biology using a unique amalgamation of core and elective papers with major inter-disciplinary components.

INTRODUCTION

The B.Sc. - Botany honours programme is intended to equip students with indispensable knowledge and technical skills to study plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core and elective papers with significant interdisciplinary components. Students would be exposed to cutting-edge technologies that are currently used in the study of plant life forms, their evolution and interactions with other organisms within the ecosystem. Students would also become aware of the social and environmental significance of plants and their relevance to the national economy.

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

Nature and extent of the B.Sc Honours Botany Programme Content: Botany is the broad discipline encompassing various subjects complex with the study of plants. The B.Sc Botany (H) Programme imparts knowledge on various fields of plant biology through teaching, interactions and practical classes. Students would gain wide knowledge as follow:

1. Diversity of plants and microbes their habitat, morphology, and reproduction.
2. Genetics and molecular biology of plants
3. Fungi and disease causing microbes and fungi
4. Economic value of plants and their use in Biotechnology Biodiversity generally refers to the variety and variability of life on earth.

Introduction to Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi and to various plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms) and information on the Ecological and Economic Importance of Microbes, Fungi and various plant groups to enable students understand and understand relevance of Microbes and Plants to environment and human well-being. Insight into the line of Plant Evolution on Earth and the consequent Biodiversity is instrumental in creating Awareness on the threats to biodiversity and sensitize young minds towards the Biodiversity Conservation for sustainable development.

Aims of Bachelor's degree programme in (CBCS)

B.SC.(HONS.) BOTANY

Content:

1. Provide an introduction to Biodiversity ranging from Microbes (Viruses and Bacteria), to Fungi, including diverse plant groups (Algae and Archegoniates-Bryophytes, Pteridophytes and Gymnosperms).
2. To enable students to understand and appreciate the relevance of Microbes and Plants to environment (ecological significance) and human well-being (economic importance).

3. Develop an understanding of Evolution of Plant forms and the consequent Biodiversity. These are instrumental in creating awareness on the threats to biodiversity and sensitizing students towards the Conservation of Biodiversity for sustainable development.
4. To study the organization of cell, cell organelles and biomolecules (i.e protein, carbohydrate, lipid and nucleic acid) to gain knowledge on the activities in which the diverse macro molecules and microscopic structures inhabiting the cellular world of life are engaged. This will facilitate the students to understand the various metabolic processes such as respiration, photosynthesis etc. which are important for life.
5. To introduce students to application of microbes in Industrial production and Environmental remediation strategies.
6. New knowledge and widening of the knowledge acquired in by handling of classical and modern plant biotechnology processes, including tissue culture for healthy plants, plants with improved characteristics.
7. To explore the natural genetic variation in plants and to understand how diverse factors (at the cellular level) contribute to the expression of genotypes and hence to phenotypic variation.
8. Understanding of biotechnological processes such as recombinant DNA technology and its applicative value in pharmaceuticals (vaccines, antibodies, antibiotics etc.), food industry (transgenic crops with improved qualities (nutraceuticals, industrial enzymes etc.), agriculture (biotic and abiotic stress tolerant plants, disease and pest resistant plants, improved horticultural varieties etc.), ecology (plants role in bioremediation). This knowledge is central to our ability to modify plant responses and properties for global food security and commercial gains in biotechnology and agriculture.
9. In the laboratory classes, students will achieve some of the techniques currently used to generate information and detect genetic variation.
10. Understanding of plant classification systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various plants groups.
11. Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and the use of transgenic technologies for basic and applied research in plants.
12. Understanding of various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology and use of bioinformatics tools and databases and in the application of statistics to biological data
13. To provide new information, enhance core competency and discovery/inquiry based learning of learners. A botany graduate would be competent in the field to undertake further disciplinespecific studies, as well as to begin domain-related employment.
14. To make students aware of most basic domain-independent knowledge, including critical thinking and communication.
15. To enable the graduate to organize for national and International competitive examinations for employment.

The B.Sc. - Botany programme is formed to gain knowledge and technical skills to study plants in a holistic manner. Students would get training in various disciplines of plant sciences using a combination of core and elective papers with significant inter-disciplinary components. Analytical reasoning. The student would develop a skill to analyze the awareness of the subject and think in a multidirectional way to solve the problem and to gain benefit in a sustainable manner. They would be able to think about the use of plants as industrial resources or as human source of revenue support system and is well versed with the use of transgenic technologies for basic and applied research in plants. The students will be able to demonstrate the knowledge in understanding research and addressing practical problems. Student will learn the application of various scientific methods to address different questions by formulating the hypothesis, data collection and critically analyze the data to decipher the degree to which their scientific work supports their hypothesis. Reflective thinking The structure and content of the course enables students to reflect on the learnings from different courses and integrate the same for a problem solving approach. They would be capable of correlating various concepts applicable to diverse situations and phenomenon. Multicultural competence Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and is well versed with the use of transgenic technologies for basic and applied research in plants. Lifelong learning The subject of botany the applied theoretically and practically applied in day today life. The successful students will be able to learn the basic concepts, principles and processes in plant biology. They have the ability of explanation of concepts, principles and usage of the acquired knowledge in biotechnological, pharmaceutical, medical, ecological and agricultural applications. Use basic biology techniques to explore molecular biology of plants Self-directed learning The programme also has a strong interdisciplinary constituent. Emphasis is on experiential knowledge through hands-on laboratory exercises, field trips and assignments. Current thrust areas of teaching provide students with substantial exposure and skills in plant biology. Communication Skills The students will develop a confidence on gaining the knowledge and skill after this course and they will be able to effectively communicate their views, present their work and impress the audience. Students are expected to possess a standard of communication skills expected from a 11 science graduate in the country. They are expected to read and understand documents with indepth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea/finding/concepts to a wider audience Research-related skills This course provides wide interdisciplinary knowledge and stimulates the students to think beyond the course knowledge, apply this knowledge for solving the environmental problems, efficient use of resources by designing novel and innovative experiments. . Students are expected to be aware about activities in the natural surroundings to awaken their curiosity. They are expected to design a scientific experiment through statistical hypothesis testing and reasoning. Cooperation/Team work The students would learn team work, division of the work and the

corporate life of the academics. They are expected to be team players, with productive cooperation involving members from diverse socio-cultural backgrounds. Information/digital literacy The students would learn the use of the new technologies used in learning biology, digital platforms for fast transfer of information. Students will attain digital skills and integrate the fundamental concepts with modern tools. Moral and ethical awareness/reasoning Besides the theoretical knowledge, the student is familiar with moral and ethical duties, an awareness towards the conservation of nature and natural resources. Students will also strengthen their ethical and moral values and shall be able to deal with psychological weaknesses. Learners are expected to be responsible citizen and be aware of moral and ethical duties. They are expected to define their core ethical virtues good enough to differentiate what construes as illegal and criminal under Indian constitution. Learners should know academic and research ethics, Benefit Sharing, Plagiarism, Scientific Misconduct etc. Leadership readiness/qualities The vast and deep knowledge of the subject, analytical and scientific reasoning, effective communication and problem solving task develop special qualities in a person to attract and influence the audience, which would be gained after the completion of this course. Students are expected to be familiar with decision making process and basic managerial skills to become a better leader. Skills may include defining objective vision and mission, how to become responsible citizens and charismatic inspiring leader.

PROGRAMME LEARNING OUTCOME

The course learning outcomes are associated with program learning outcomes but these are specific to-specific courses offered in a program. The course level learning shall be reflected as program level learning. The core courses shall be the backbone of this framework whereas discipline electives, generic electives and skill enhancement courses would add academic excellence in the subject collectively with multi-dimensional and multidisciplinary approach.

1. Understanding of plant classification systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various life-forms. Understanding of a variety of analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and is well versed with the use of transgenic technologies for basic and applied research in plants.

2. Understanding of various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology and use of bioinformatics tools and databases and the application of statistics to biological data.

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