M. Sc. Botany

Programme Outcome

Plants are the important component of environment and their sustenance is important for environmental sustainability apart from having socio-economic importance. On completion of programme, students will be able to enhance their all round development in the following areas:

1) **Biodiversity understanding:** Understand the plant diversity w.r.t big Tree of Life (TOL) Project.
2) **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development with respect to assessment, conservation and utilization of floral diversity.
3) **Conservation Awareness:** Students will become aware regarding overexploitation of plants and can learn to apply the conservation strategies for their sustainable use in future.
4) **Societal Impact:** Develop the ability of the students to apply Plant Science Knowledge to transform the society through their education.
5) **Honesty, Integrity & Ethics**: Student will become aware about ethical issues and regulatory considerations while addressing society needs for growth with honesty.
6) **Scientific temper**: Make students curious about Botany to enhance and develop a scientific attitude & encourage the students to do research in different disciplines of Botany (Plant Sciences).
7) **Creative thinking:** Include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information.
8) **Inculcate technical skills:** Analyze and interpret results generated through studies in botany, taxonomical treatments, field studies, Botanical tours and laboratory techniques used in the subject.
9) **Quantitative reasoning:** Use quantitative reasoning by applying mathematical calculations and graphing skills to solve problems in plant science (Botany).
10) **Team work**: The Programme would inculcate team work spirit in students to perform functions that demand higher competence in national/international organizations with sporty spirits and helping each other.
11) **Life long learning and motivating others to learn**: Students would lend the support to other students to grow with them with equal opportunities.
12) **Global thinking**: Knowledgeable disciplined students with good moral values, ethics and politeness will help in nation building globally. Students will also develop attitude to search for higher education avenues abroad.
13) **Professional Development & Career Progression**: Students will get exposure to various career options at National and International level in academia & R&D.
14) **Journal Club & Seminars**: Students will get exposure to develop their communication and presentation skills.
15) **Competitive Exam at National Level & Applying for Grants:** All the courses in the programme are carefully designed to equip the students for competitive exams like CSIR-UGC (NET-JRF), SET; GATE etc. and other UT J&K and other national levels and write research proposals for grants.

PAPER SPECIFIC OBJECTIVES

Course Objectives for Microbiology, Mycology and Phycology

- Study of diversity in life forms in big 'tree of life'.
- Students will learn GTS & origin of prokaryotes & eukaryotes.
- To study the life cycle of viruses, microbes, fungi, algae & their role in biosphere.
- Learn basics of microbial life, growth and nutrition of microbes, their culture and applications.
- Increase awareness and appreciation about human friendly viruses, bacteria, fungus, algae and their economic significance.

Course Objectives for Biology of Archegoniates

- It is designed to help students understand the diversity of Bryophytes, Pteridophytes & Gymnosperms.
- Understand their evolutionary origin & significance w.r.t Geological Time Scale.

Course Objectives for Plant Taxonomy

- Understand historical development of plant taxonomy.
- Learn techniques of plant identification.
- Study latest APG classification & role of ICN & IAPT.
- Learn role of experimental taxonomy & biosystematics in variation studies & speciation issues.

Course Objectives for Economic Botany

- This course is framed to make students understand economic botany, its importance vis-à-vis economically important plants.
- Students will learn about Cereals, Millets, Legumes, Pulses & useful medicinal plants growing in Kashmir Himalayas.

Course Objectives for Evolutionary Biology

- This course is framed to equip students about basics of evolutionary biology like organic evolution, Darwinism, Mendelism, Neo-Darwinism.
- They will learn basics of population genetics &Biogeography.

Course Objectives for Plant Physiology & Biochemistry

- To learn about basic plant water relations, mechanism of transport.
- To study detailed mechanism of photosynthesis.
- Learn processes of Plant biochemistry.
- Know about the basic principles of plant function, metabolism, secondary products principles of plant growth & development.
- To study the molecular mechanism of phytohormones.
- To study nitrogen metabolism & its role in N_2 cycle.

Course Objectives for Plant Cell & Molecular Biology

- This course is designed for understanding advanced knowledge in plant cell & molecular biology.
- Cell Biology will help students understand & appreciate functioning of an individual cell & its organelles.

- The course is focused on the Central Dogma of life where students will understand the regulation of genes in response to different conditions.
- The students will understand the basic concepts of molecular biology and genetic engineering. It will enhance their understanding of various vital life processes life at molecular level.
- The students will be expected to gain knowledge in the gene regulation, Genomics and Transcriptomics.

Course Objectives for Plant Development & Reproductive Biology

- This course will also make students understand advanced plant embryology w.r.t flower, fruit & seed development. Students will understand how genes control different aspects of plant life.
- This course is designed for making students understand molecular genetics behind seed germination, seedling growth, SAM-RAM functioning & organ determination (root, shoot & leaf).
- Students will understand internal structure of plants & learn different cell types controlling water & sugar transport.

Course Objectives for Plant Tissue Culture & Techniques

- The knowledge generated through this paper will help in entrepreneurship development for economic benefits.
- This course will make students aware about the role of PTC techniques in solving various problems like food insecurity, secondary metabolite production; mass multiplication of plants.
- Students will learn techniques of *in vitro* cultures in threatened plants for conservation.

Course Objectives for Plant Ecology & Phytogeography

- This course is designed for making students understand working of physical & biological environment.
- Students will learn about ecosystem structure & function.
- Students will learn population & community ecology problems; Species interactions as part of ecosystem services & role of Phytogeography.
- Students will finally understand problem of pollutions & global climate change & global organizations role in mitigating CO_2 emissions.

Course Objectives for Genetics, Epigenetic & Inheritance Biology

- Understand the history of gene concept, interaction of genes, genetic recombination producing the characters differently.
- The course will envisage on the basics and advancements in the area of Genetics and its application to understand various phenomena of inheritance in living world.
- Students will learn about Epigenetics in modern context w.r.t human genetic disorders.
- Gain knowledge in the frontier fields of population, evolutionary and quantitative genetics.
- Students will learn about Epigenetics in modern context w.r.t human genetic disorders.

Course Objectives for Plant Pathology & Protection

- Students will learn about important plant diseases & role of plant pathology in mitigating loss of crop yield.
- Students will learn about post harvest technology w.r.t fruits, crops & vegetables.
- Students will learn about management of plant diseases.

Course Objectives for Plant Genetic Engineering

- Learn recombinant DNA Technology techniques & gene cloning.

- Learn gene isolation techniques & development of genomic & cDNA libraries.
- Learn methods of generating transgenic plant.
- Learn role of genetic engineering in crop improvement programmes.

Course Objectives for Stress Biology & Secondary Metabolites

- To study plant stress physiology & its role in understanding plant adaptation at molecular level.
- To study recent advances in the field.
- To study molecular crosstalk during signal transduction in plants.
- To study role of plant secondary metabolites during stress.

Course Objectives for Biostatistics & Bioinformatics

- To study application of statistics in research.
- Learn use of basic statistical tools in plant biology.
- Learn basics of Bioinformatics.

Course Objectives for Research Project Work/Training//Internship

- Students will get actual laboratory exposure.
- To expose students about technique of project proposal writing, project execution of particular research problem.
- Learn art of drafting while dissertation compilation.
- Get exposure of research methodology, biostatistics application.