

M.Sc. (Ag) Genetics and Plant Breeding (GGPB23)

GGPB23 611 principles of genetics (2+1)

Course outcomes

- CO1: Students will acquire comprehensive understanding of the chemical basis of heredity.
- CO2: The knowledge required to design, execute, and analyze the results of genetic experimentation in Plant Breeding systems
- CO3: Critical understanding on quantification of heritable traits that provides insight into cellular and molecular mechanisms.
- CO4: The ability to evaluate conclusions that are based on genetic data.

GGPB23 612 Principles of plant breeding (2+1)

Course outcomes

- CO1: Students will be well versed in practical emasculation and pollination methods of important crops.
- CO2: To understand the various components to structure a plant breeding programme.
- CO3: Know the requirements in breeding for biotic and abiotic stress tolerant varieties.
- CO4: Learn the impact of IPRs including PBR, PVP and PPVFRA
- CO5: Students will acquire independent ability to carry out statistical analysis of data and Interpretation of results in breeding programs.

GGPB23 613 Breeding field crops-I (2+1)

Course outcomes

- CO1: Acquire knowledge on floral biology and selection of proper breeding method.
- CO2: Cultivate skill in emasculation and pollination of various crop plants.
- CO3: Gain expertise on hybrid seed production techniques.
- CO4: Learn to use the descriptors in various crops for selection of superior genotypes.

GGPB23 621 Principles of quantitative genetics (2+1)

Course outcomes

Learn principles and methodologies of quantitative genetics so that the students are able to:

- CO1: Analyze and evaluate literature involving quantitative genetic experiments.
- CO2: Design and analyze quantitative genetic experiments
- CO3: Statistically analyze the phenotypic data of plant traits collected taking into account G X E interaction.
- CO4: Manage breeding populations to maximize progress from selection for accomplishment of breeding objectives.

GGPB23 622 Principles of cytogenetics (2+1)

Course outcomes

The students can learn to

- CO1: Understand the basics of chromosome structure and occurrence of cytogenetic abnormalities
- CO2: Fix and count meiotic and mitotic chromosomes of major crops
- CO3: Analyse chromosome abnormalities in inter-specific crosses
- CO4: The student will be able to carry out cytological analysis in breeding populations.

GGPB23 623 Breeding field crops-II (2+1)

Course outcomes

- CO1: Acquire knowledge on floral biology and selection of proper breeding method.

- CO2: Cultivate skill in emasculation and pollination of various crop plants.
- CO3: Gain expertise on hybrid seed production techniques.
- CO4: Learn to use the descriptors in various crops for selection of superior genotypes.
- CO5: Students will be able to independently plan and design breeding experiments for crop improvement.
- CO6: Will be capable of handling segregating populations in major crops.

GGPB23 624 Biotechnology for crop improvement (2+0)

Course outcomes

- CO1: Ability to apply the concepts and principles of plant tissue culture techniques on research problems pertinent to crop improvement
- CO2: Dissemination of skills on usage of the acquired knowledge on practical biotechnology tools to augment plant breeding research.
- CO3: The knowledge required to execute, analyze and apply molecular marker systems for crop improvement.

OPC-GGPB23 621 Concepts of crop physiology (2+1)

Course outcomes

- CO1: Will be able to identify the crop mineral nutrient deficiencies and their symptoms
- CO2: In addition, hands on exposure to preparation of solutions, analysis of pigment composition, estimation of growth analytical parameters
- CO3: Will be able to diagnose and correct nutrient deficiencies,
- CO4: Will be competent in enzyme assays and application of plant growth regulators.

OPC-GGPB23 711 Germplasm collection, exchange and quarantine (2+1)

Course outcomes

- CO1: Students will have knowledge on the conservation of biodiversity
- CO2: They will be able to identify the various in situ and ex situ conservation techniques
- CO3: They will acquire knowledge on various organizations involved in conservation and their policies
- CO4: The students will have knowledge on plant quarantine regulations.

OPC-GGPB23 712 Fundamentals of genetics (2+1)

Course outcomes

- CO1: Students will acquire comprehensive understanding of the chemical basis of heredity.
- CO2: The knowledge required to design, execute, and analyze the results of genetic experimentation in Plant Breeding systems
- CO3: Critical understanding on quantification of heritable traits that provides insight into cellular and molecular mechanisms.
- CO4: The ability to evaluate conclusions that are based on genetic data.

M.Sc. (Ag) Plant Molecular Biology and Biotechnology (GGPB21)

GGPB21 611- Principles of biotechnology (2+1)

Course outcomes

- CO1: Ability to apply the concepts and principles of plant tissue culture techniques on research problems pertinent to crop improvement
- CO2: Dissemination of skills on usage of the acquired knowledge on practical biotechnology tools to augment need based research.
- CO3: Technical knowhow and exhibition of contemporary knowledge in Biotechnology for economic utilization.
- CO4: Compile and interpret results applying tools of biotechnology research.
- CO5: Applying learned process to undertake sustainable exploitation of plant and microbial resources in an environmentally-sensitive manner.

GGPB21 612 – Fundamentals of molecular biology (2+1)

Course outcomes

- CO1: Understand and apply the principles and techniques of Molecular biology.
- CO2: Comprehensive understanding on Nucleic acids that provides insight into cellular and molecular mechanisms.
- CO3: The knowledge on DNA control mechanism in terms of replication and recombination to design and execute gene manipulation research underlying social and environmental ventures.
- CO4: The ability to synthesize, evaluate and understand molecular marker based data.

GGPB21 613 Techniques in molecular biology (2+1)

Course outcomes

- CO1: Conceptual knowledge on creation of new genetic variation and significance of genetically modified organisms.
- CO2: Gain insight into the most significant molecular methods used today to expand our understanding of biology
- CO3: The knowledge required to design, execute, and analyze the results of Molecular markers in gene manipulation systems.
- CO4: Prepares students for further education employment in teaching, basic research or agricultural professions.
- CO5: Present hypotheses and select, adapt and conduct molecular and cell-based research program to either confirm or reject the hypotheses.

GGPB21 621 Molecular cell biology (2+1)

Course outcomes

- CO1: Implant Knowledge on energy utilization and generation in cells
- CO2: Insinuate causal relationships between molecule and cell Level phenomena and organism-level patterns of heredity
- CO3: Understand the structure and function of prokaryotic and eukaryotic cells, as whole entities and in terms of their sub cellular processes.
- CO4: Link the rapid advances in cell and molecular biology to better understanding of diseases including cancer
- CO5: Demonstrate advanced laboratory bench skills, lab notebook record keeping, and team work.
- CO6: To exhibit clear and concise communication of scientific data.

GGPB21 622-Plant tissue culture and genetic transformation (2+1)

Course outcomes

- CO1: Standardize protocols for the *in vitro* propagation from *ex vitro* explants
- CO2: To optimize the culture conditions for rapid propagation and regeneration of agriculturally important plants.
- CO3: Bio chemical monitoring of explants proliferation and regeneration
- CO4: Optimization of medium and culture conditions for the enhancement of active principle production
- CO5: Bio chemical characterization of regeneration and genetic transformation for economic utilization.

GPB21 623 Genomics and proteomics (2+1)**Course outcomes**

- CO1: Identify and use bioinformatics tools to solve problems in molecular biology and plant breeding.
- CO2: Identify and describe the different components in prokaryotic and eukaryotic genomes and proteomes.
- CO3: Tools commonly used in genome sequencing, assembly and annotation.
- CO4: Use the different methodologies, techniques commonly used in proteomics and metabolomics

GGPB21 624 Molecular plant breeding (2+0)**Course outcomes**

- CO1: Conceptual understanding of plant breeding and the molecular techniques
- CO2: Deliniate molecular techniques as tools for conventional plant breeding
- CO3: Explore practical applications and impacts of molecular breeding tools in crop improvement programs
- CO4: Learn how to use molecular techniques data analysis software including mapping software programs

OPC-GGPB21 621 Concepts of crop physiology (2+1)**Course outcomes**

- CO1: Students able to identify different physiological process like imbibitions, diffusion and ascent of sap
- CO2: Will be able to identify C3, C4 and CAM plants
- CO3: Will be able to identify and rectify the various stresses

OPC-GGPB21 711 Bio-instrumentation (2+1)**Course outcomes**

- CO1: Ability to understand diagnosis and repair of related equipments
- CO2: Understanding the problem and ability to identify the necessity of an equipment to a specific problem
- CO3: Ability to take measurements involved in some agricultural equipments.

OPC-GGPB21 712 Plant tissue culture (2+1)**Course outcomes**

- CO1: Standardize protocols for the *in vitro* propagation from *ex vitro* explants
- CO2: To optimize the culture conditions for rapid propagation and regeneration of agriculturally important plants.
- CO3: Bio chemical monitoring of explants proliferation and regeneration
- CO4: Optimization of medium and culture conditions for the enhancement of active principle production

CO5: Bio chemical characterization of regeneration and genetic transformation using Agrobacterium.

M.Sc. (Ag) Seed Science and Technology

GGPB22 611 Floral biology, seed development and maturation (2+1)

Course outcomes

CO1: Student gain knowledge about meaning of seed and its structure

CO2: Student will get knowledge on seed development and maturation of various crop plants

CO3: Student will get knowledge on pollination behaviour and food reserves accumulation pattern of crop plant

GGPB22 612 Principles of seed production (2+1)

Course outcomes

CO1: To believe the role of good quality seed in agriculture

CO3: To grasp the significance of basic principles of seed production in crop plants

CO3: To knows the systems involved in seed production

GGPB22 613 Seed physiology (1+1)

Course outcomes

CO1: To enjoy the physiological processes involved in seed

CO2: To understand the physiological mechanism involved in dormancy and germination

CO3: To compare the role of growth regulators in seed germination

GGPB22 621 Seed production in field crops (2+1)

Course outcomes

CO1: To really understand the principles of seed production and the importance of seed labels

CO2: To impart knowledge about various tools involved in hybrid seed production of crop plants

CO3: To build private seed farms

GGPB22 622 Seed legislation and certification (2+1)

Course outcomes

CO1: To understand legal procedures related to seed quality control

CO2: To really understand the procedure for seed certification

CO3: To grasp the importance of Indian minimum seed certification standards

GGPB22 623 Seed processing and storage (2+1)

Course outcomes

CO1: To impart knowledge on processing sequence for various crop plants

CO2: Students will get knowledge principles and mode of action of various seed processing equipments

CO3: Students will get knowledge on seed storage methods and seed treatment procedures

GGPB22 624 Seed quality testing (2+1)

Course outcomes

CO1: To grasp the significance of seed quality testing

CO2: To afford knowledge on various organization involved in seed testing

CO3: To provide knowledge about various seed testing procedure with tolerance

OPC-GGPB22 621 Concepts of crop physiology (2+1)

Course outcomes

CO1: Students will get knowledge on growth and development on C3, C4 and CAM plants

CO2: Students will get knowledge on growth hormones, flowering hormones, plant science etc.

CO3: Students will get knowledge on biotic and abiotic stress physiology of crop plants

OPC-GGPB22 711 Seed production techniques in crops (2+1)

Course outcomes

CO1: To really understand the basic principles of seed production in varieties and hybrids

CO2: To know the concept of and methods of hybrid seed production CO3: To understand the importance of field standards and seed standards in quality seed production

OPC-GGPB22 712 Seed quality testing and certification (2+1)

Course outcomes

CO1: To have a faith in seed certification procedure and importance of IMSCS

CO2: To sort out the rogues and off types from the seed production area and to understand the importance of seed testing

CO3: Will be in a position to emphasis on Seed Legislation, certification, labelling of different seed classes and truthfully labelled seeds