

**MASTER OF SCIENCE  
PLANT BIOLOGY**

**INTRODUCTION**

The Department of Biological Sciences (College of Science) offers a Master of Science program in **Plant Biology**. Only full-time students are admitted to this program. The program is designed to offer research opportunities in Cytogenetics and Chemical Mutations, the effect of the most common drugs on the process of mitosis and the chromosome structure, detection, identification and evaluation of the environmental mutagens and carcinogenesis, ecology, desert ecology, synecology to environmental factors, biotic influence, plant taxonomy, flora of arid regions and flora of Kuwait and the Gulf States. Plant physiology particularly the biochemistry of photosynthesis and related processes and the development and structure of chloroplasts.

*According to the University Council decision dated 4/2/2007, Thesis students admitted with effect from September 2007 are exempted from the comprehensive examination.*

**PROGRAM REQUIREMENTS**

The program requirements are:

**30 TOTAL COURSE CREDITS (credits in parenthesis)****9 COMPULSORY**

- 0480-385 Statistical Methods in Research (3)
- 0494-501 Research Techniques (3)
- 0494-502 Seminar (1)
- 0494-503 Advanced Topics in Botany (2)

**12 ELECTIVES\* (3 credits each)**

- 0494-526 Phytoplankton
- 0494-533 Developmental Genetics
- 0494-535 Molecular Plant Biology
- 0494-537 Pollution and Genotoxicity
- 0494-543 Plant Biotechnology
- 0494-545 Advanced Plant Breeding
- 0494-547 Advanced Plant Taxonomy
- 0494-564 Advanced Plant Ecology
- 0494-565 Stress Ecophysiology
- 0494-571 Plant Growth and Development
- 0494-573 Photobiology
- 0494-582 Plant Disease Management

\*The graduate students will be allowed to take 6 credit hour courses from different disciplines of the Department of Biological Sciences. **The student can only take these courses with the approval of the thesis supervisor.**

The graduate students in the Department of Biological Sciences will be allowed to take three credit hour course/s in Medical/Science faculty **with the approval of thesis supervisor.**

**9 COMPULSORY (Thesis)**

0494-597	(0)
0494-598	(0)
2000-599	(9)

***COURSE DESCRIPTION***

**0494-501: RESEARCH TECHNIQUES  
CR: 3**

Exercises and demonstrations dealing with theoretical and practical aspects of modern techniques in different disciplines of plant biology.

selected organisms (drosophila, plant and animal examples) – Genetic control of gametogenesis - Genetic analysis of cell cycle development - Programmed cell death and normal development.

**0494-502: SEMINAR  
CR: 1**

Reading and discussions of current literature and research. Seminars can be arranged to suit interests and demands of different sub disciplines.

**0494- 535: MOLECULAR PLANT BIOLOGY  
CR: 3**

Structural details of plant genomes such as nuclear. Chloroplast, mitochondria and disposable elements. Plant transformation. The genome of Arabidopsis. The molecular aspects of nitrogen fixation, development of flower and seed, and pest resistance. Application of genetic engineering in plants

**0494-503: ADVANCED TOPICS IN BOTANY  
CR: 2**

Detailed study and analysis of aspects of botany beyond those covered in regular classes. Topics vary from term depending on staff member's field of specialization.

**0494-537: POLLUTION AND GENOTOXICITY  
CR: 3**

Changes in eukaryotic gene expression in response to environmental stress. Methodology for detecting mutations and clastogenic effects at the molecular, cellular and entire organism levels. Mutagens in the environment. Genetic risk of atomic energy. Biological indicators of environmental pollution.

**0494-526: PHYTOPLANKTON  
CR: 3**

Diversity of phytoplankton. Physical and chemical environment of phytoplankton. Physical ecology of phytoplankton. Phytoplankton populations. Phytoplankton physiology. Mechanisms of phytoplankton buoyancy. Nutrients uptake and assimilation in phytoplankton. Growth and mortality of phytoplankton.

**0494-543: PLANT BIOTECHNOLOGY  
CR: 3**

The course emphasizes the use of molecular biology techniques to improve cultivated plants. It will address basic, and applied sciences and also taking into consideration the ethics and values.

**0494-533: DEVELOPMENTAL GENETICS  
CR: 3**

Regulation of gene expression in eukaryotes and prokaryotes – Genetic control of development in

**0494- 545:   ADVANCED PLANT BREEDING  
CR: 3**

Importance, basics and updated biological concepts of plant breeding science. Essential requirements and tools. Major objectives and examples of classical breeding achievements. Developed molecular approaches and their applications in modern plant breeding . Emergency of recent topics associated with methodologies, economics, risks and constraints of new breeding strategies.

**0494-547:   ADVANCED PLANT TAXONOMY  
CR: 3**

Characters, taxa and species. Taxa and species concepts. The process of classification. Different sources for taxonomic information extracted from cytotaxonomy, chemotaxonmy, immunotaxonomy, and molecular biology. Identification and Classification using molecular methods.

**0494-564:   ADVANCED PLANT ECOLOGY  
CR: 3**

Major bio-mass of the world. Plant adaptations to different habitats. Interaction among plants and between plants and their physical environment. Properties of plant populations. Landscape ecology. Factors influencing the structure of plant communities. Ecology of desert ecosystems. Desert of Kuwait, habitat loss, biodiversity and conservation. Soils of Kuwait.

**0494-565:   STRESS ECOPHYSIOLOGY  
CR: 3**

Importance, definitions and types of stresses. Plant cell water relations. Regulation of cell growth under stress. Water deficits and the adjustment of photosynthetic carbon metabolism.

Osmoregulation and stress hormones. Molecular bases of tolerance to abiotic stress. Research in stress ecophysiology and its link to modern improvements in physiology research techniques.

**0494-571:   PLANT GROWTH AND  
DEVELOPMENT  
CR: 3**

Physiology of growth and development of the different parts of the plant. The structure and metabolism of plant hormones. Integration of hormone signaling and floral induction.

**0494-573:   PHOTOBIOLOGY  
CR: 3**

Study of the interaction of light with plants. Physiology of photobiological processes. Nature of pigments and receptors involved. Environmental factors affecting photosynthesis and repair mechanisms in photo biological.

**0494-582:   PLANT DISEASE MANAGEMENT  
CR: 3**

Disease management as (a) an integral component of plant production and growth, and (b) a logical integration of pathogen biology with modern management technologies.

**0494-597:   THESIS  
CR: 0**

**0494-598:   THESIS  
CR: 0**

**2000-599:   THESIS  
CR: 9**