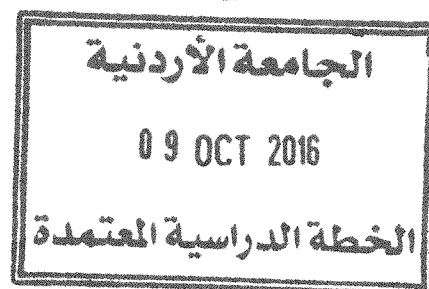


1.	Faculty	Agriculture
2.	Department	Horticulture and Crop Science
3.	Program title (Arabic)	ماجستير التقانات الحيوية
4.	Program title (English)	Master Program in Biotechnology
5.	Track	Thesis Track



	Serial #	Degree	Dep #	Faculty #	Year	Track
Plan Number					2013	

First: General Rules & Conditions:

1. This plan confirms to the valid regulations of programs of graduate studies.
2. Specialties of Admission:
 - The First priority: Bachelors of Agricultural Sciences (all branches)
 - The Second priority: Bachelors of Biological Sciences, Biochemistry, Genetic Engineering or Biotechnology.
3. Admission policies: The Third Policy

Second: Special Conditions: None.

Third: Study Plan: Studying (33) Credit Hours as following:

1. Obligatory Courses (18) Credit Hours:

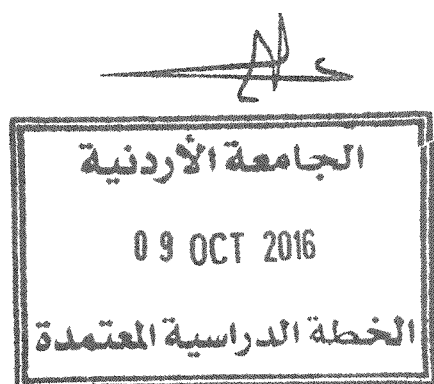
Course No.	Course Title	Credit Hours	Theory	Prac.	Prerequisite
0601701	Experimental Design and Analysis	3	3	-	
0601781	Biotechnology	3	3	-	
0601782	Bioinformatics	3	3	-	
0601783	Techniques in Biotechnology	3	1	2	
0304711	Biochemistry	3	3	-	
0304716	Molecular Biology	3	3	-	

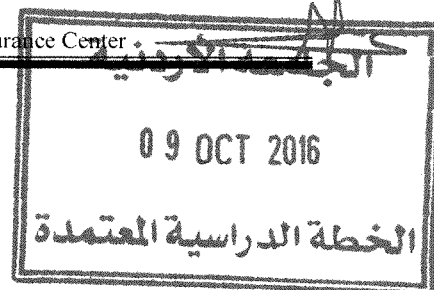
2. Elective Courses: Studying (6) Credit hours from the following:

Course No.	Course Title	Credit Hours	Theory	Prac.	Prerequisite
0601742	Plant Tissue Culture	3	3	-	
0601784	Molecular Plant Breeding	3	3	-	
0601785	Special topics	3	3	-	

0602761	Quantitative and Population Genetics	3	3	-	
0603733	Biotechnology in Food & Nutrition	3	3	-	
0603791	Protein & Enzyme Engineering	3	3	-	
0604710	Environmental soil microbiology	3	3	-	
0606791	Bio-pesticides	3	3	-	
0606792	Host-pathogen Interaction	3	3	-	
0606793	Plant Pathogens Identification	3	3	-	

3. Thesis: (9) Credit hours (0600799).





**Course description of Master program in
Agricultural Biotechnology
(Thesis Track)**

(0601701) Experimental Design and Analysis (3 Credit Hours)

This course covers linear and multiple regression and correlation, analysis of variance and basic experimental design analysis. Mean separation procedures, Duncan's Multiple Range Test (DMRT), Turkey's W. procedure, Least Significant Difference (LSD), and Orthogonal contrasts. Students will be exposed to the uses of PC in experimental design and analysis.

(0601742) Plant Tissue Culture (3 Credit Hours)

This course introduces the principles of plant tissue culture. It exposes students to the laboratory setup and equipments required in plant tissue culture. It also covers the media constituents as well as the preparation of media. The course covers the methods and techniques used in plant tissue culture.

(0601781) Biotechnology (3 Credit hours)

This course covers the exploitation of microbial cells, metabolites (i.e. enzymes), and gene expression in several areas of industrial, agriculture and environmental biotechnology, discuss the relationship between microbial and plant cell physiology and biotechnology, covering the recombinant DNA and fermentation technology, genetic manipulation, bioreactors designs, kinetic studies in biotechnology, biological remediation, plant tissue and cell culture, solid-state fermentation, process optimization and scale up procedure, modeling of biotechnological processes.

(0601782) Bioinformatics (3 Credit Hours)

This course covers the computational tools for classifying sequences, large databases of biological information, computationally intensive methods, new algorithms, machine learning unite to extract new concepts, new sophisticated DNA, RNA and protein sequence analysis. Pattern recognition and DNA computing, and traditional mathematical modeling's. Analysis of macromolecular sequences, tri-dimensional structures, phylogenic relationships, and genomic and proteomic data.

(0601783) Techniques in Biotechnology (3 Credit Hours)

This course covers the a comprehensive review and training of the technologies in biotechnology research and application: PCR method, gel electrophoresis, DNA-RNA-protein isolation and characterization, DNA-RNA-protein blotting and detection, sequencing, cloning, ELISA.

(0601784) Molecular Plant Breeding (3 Credit Hours)

This course covers the review of basic genetics, inheritance of unlinked and linked traits, and recombination, genetic recombination as a tool for genetic map construction, theory and application of DNA markers for mapping and selection, including pros, cons, and their special characteristics, DNA markers (RFLP, RAPD, AFLP, SSR, EST, STS, SNP), marker assisted selection in various breeding systems, and quantitative trait loci (QTL) concept and its application in plant breeding programs.

(0601785) Special Topics (3 Credit Hours)

Special topics that coincide with students, interests to widen their background and understanding of topics directly related to their research work.

(0304711) Biochemistry**(3 Credit Hours)**

Aqueous solutions, acids, bases, buffers, titrations and functional groups, the covalent structure of proteins including their primary and three dimensional structure, protein folding, dynamics and evolution, techniques of macromolecular isolation and purification, hemoglobin as an example of protein function in microcosm.

(0304716) Molecular Biology**(3 Credit Hours)**

Introduction to chemistry and conformation of DNA, transposition, gene families, recombinant DNA technology, DNA-protein interaction, regulation of gene expression, regulation of cell cycle. Ontogenesis.

(0602761) Quantitative and Population Genetics**(3 Credit Hours)**

This course covers Principles and applications of population and quantitative genetics; factors affecting genetic and genotypic frequencies; methods of estimating genetic and non-genetic variances; heritability and breeding values; the role of mating systems and selection procedures in producing superior genetic populations.

(0603733) Biotechnology in Food and Nutrition**(3 Credit Hours)**

Applications of biotechnology in food examination, production of food substitutes, modification of food functional properties, unit operations used in biotechnology, bioreactors, and in bioconversion of raw materials. Biotechnology of vitamins, growth factors, hormones, and amino acids regarding production, modification, and the know-how of their use in food enrichment. Regulatory and social aspects of food and nutrition biotechnology.

(0603791) Protein and Enzyme Engineering**(3 Credit Hours)**

This course covers the separation and isolation techniques of proteins and enzymes; production purification and recovery processes for enzymes and proteins; safety aspects of proteins and enzymes; recovery processes; recombinant food enzymes production through genetic engineering processes; immobilization of enzymes; enzyme reactors; design of integrated processes of enzymes engineering; genetic manipulation and enzyme engineering.

(0604710) Environmental soil microbiology**(3 Credit Hours)**

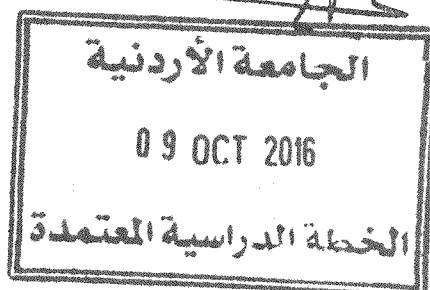
The course includes, Cell composition, Microbial community in soil, Environmental influences, Microbial transport of toxic metals, transport of pathogens through soils and aquifers, Innovations in biological processes for pollution control, Bio-remediation, Biodegradation, Bio-fertilizers, Microbial control of plant diseases. Microorganisms and biochemical cycles.

(0606791) Bio-pesticides**(3 Credit Hours)**

Microbial pesticides, biochemical plant pesticides including pheromones and conventional pesticides with emphasis on the new classes, mode of action, registration, reduced risk, environmental impact, and molecular diagnosis of pesticides.

(0606792) Host –pathogen Interaction**(3 Credit Hours)**

Mechanism of host pathogen interaction based on molecular aspects, susceptibility and resistance recognition, gene for gene theory, virulence factors, types of resistant, systemic and induced resistant to the different causal agents, environmental and genetic effects on the expression



of recognition of the different pathogens , the diversity of the different plant pathogens and its role in diseases epidemiology.

(0606793) Plant Pathogens Identification

(3 Credit Hours)

Different recent molecular techniques employed in the identification and detection plant disease causal agents including: fungi, bacteria, viruses and nematodes by using different methods such as Polymerase Chain Reaction (PCR), Serological technique including ELISA, ISEM, polyclonal and monoclonal antibodies, fatty acid composition.

