

**Study Plan**  
**Faculty of Agriculture**  
**MASTER in Land, Water and Environment**  
**(Thesis Track)**

**First: GENERAL RULES & CONDITIONS:**

Plan Number			2013
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1. This plan confirms to the valid regulations of programs of graduate studies.
2. Specialties of Admission:
  - The First priority: Bachelor's of Soil, Water and Environment
  - The Second priority: Bachelor's of Soil and/or Irrigation
  - The Third priority: Bachelor's of Agricultural Resources (irrigation) or (soil) or Management of Agricultural Resources and Environment
  - The Fourth priority: Bachelor's of Water Management or Soil Management
  - The Fifth priority: Bachelor's of Agricultural Engineering (Water)
  - The Sixth priority: Bachelor's of Water and Environment Engineering
3. Admission policies: The First Policy

**Second: SPECIAL CONDITIONS:** None.

**Third: STUDY PLAN: Studying (33) Credit hours as follows:**

**1. Obligatory Courses : Studying (18) credit hours successfully:**

Course No.	Course Title	Credit Hours	Theory	Prac.	Prerequisite
0601701	Experimental Design and Analysis	3	3	-	
0604701	Soil, Water and Plant Analysis	3	1	2	
0604702	Nutrients Management	3	3	-	
0604703	Environmental Soil Physics	3	3	-	
0604704	Irrigation Science Theory	3	3	-	
0604705	Environmental Soil Chemistry	3	2	1	

**2. Elective Courses: Studying (6) credit hours successfully from the following:**

Course No.	Course Title	Credit Hours	Theory	Prac.	Prerequisite
0604706	Environmental Impact Assessment	3	3	-	
0604707	Geographic Information System	3	2	1	
0604708	Remote Sensing	3	2	1	
0604709	Irrigation Systems Design	3	3	-	
0604710	Environmental Soil Microbiology	3	3	-	
0604711	Soil Classification (1)	3	3	-	
0901761	Surface Water Hydrology	3	3	-	

**3. Thesis: (9) Credit hours # (0604799).**

**Course Description**  
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**(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.

**(0604701) Soil, Water, and Plant analysis (3 Credit Hours)**

This course includes Fundamentals of soil, water, and plant sampling Sample treatment, Methods of analysis and their scientific foundation: Thermal methods. Emission and atomic absorption spectrophotometry. Radiochemical, chromatographic and paleographic methods. Mass spectrometry.

**(0604702) Nutrients Management (3 Credit Hours)**

This course includes Criteria of classification for plant nutrients: Macronutrients: N, P, K, Mg, Ca, Micronutrients. Fe, Zn, Mn, Mo, B, Cu, CoS, Beneficial nutrients Na, Cl, Se, Role and function of essential nutrients in plant, Soil fertility evaluation, Management of Fertilizers Application, Cropping systems and soil fertility, Crops rotation, Legumes in Crop rotation, Fertilizers & efficient use of water, Nutrients cycles and balance in nature.

**(0604703) Environmental Soil Physics (3 Credit Hours)**

This course includes Soil water movement in saturated and unsaturated conditions, salt movement, transformation and movement of solutes, gas diffusion and heat flow in soils.

**(0604704) Irrigation Science Theory (3 Credit Hours)**

This course includes Water flow in pipes and channels, pumps, system selection, development of optimal irrigation system, irrigation production function, water requirement, optimal management for irrigation.

**(0604705) Environmental Soil Chemistry (3 Credit Hours)**

This course includes Soil as a thermodynamic system. Depye-Huckel limiting law. Free ion activity coefficient. Chemical potentials of soil components. Chemical and electrochemical equilibria. Ion exchange theory. Specific anion adsorption. Demixing model of solid-liquid interface.

**(0604706) Environmental Impact Assessment (3 Credit Hours)**

This course includes Process of EIA: screening, scooping, assessment, mitigation, review and Auditing. EIA of soil pollution and methods of mitigation. EIA of water pollution sources of pollution, models and evaluation. EIA of air pollution: sources and models of prediction. EIA of Noise pollution: models of evaluation standards and their roles in EIA.

**(0604707) Geographic Information System (3 Credit Hours)**

This course includes What is geographic information. Vector and Raster data models. Database for GIS. Selection of hardware and software. Theories of undertaking spatial analysis: measurements, network and connectivity, neighborhood, surfaces, interpolation, digital elevation models, reclassification, map overlay. Spatial data accuracy. Applications of GIS in environment management.

**(0604708) Remote sensing (3 Credit Hours)**

This course includes Physical principles of remote sensing: radiation laws, reflectance and emission, atmospheric interactions and windows, platforms and technology of optical remote sensing systems. Structure of satellite imagery and concepts of resolution. Digital image processing techniques: geometric correction, enhancement and filtering. Image classification: supervised and unsupervised classification, algorithms, class separability accuracy assessment. Special image transformations: principal component analysis, vegetation indices and color.

**(604709) Irrigation Systems Design (3 Credit Hours)**

This course includes Design criteria for surface, sprinkler and trickle irrigation systems, farm systems layout, quantity surveying specification and installation of these irrigation systems.

**(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, Biofertilizers, Microbial control of plant diseases. Microorganisms and biochemical cycles.

**(0604711) Soil Classification (1) (3 Credit Hours)**

This course includes principles used in soil taxonomy, the differences between soil taxonomy and land classification, Information required to undertake classification, objectives of the classification. The general structure of the classification. The diagnostic features and horizons used in the classification, soil order, suborder etc. classification of soils of Jordan according to international system.

**(0901761) Surface Water Hydrology (3 Credit Hours)**

This course includes Hydrologic process in nature, rainfall-runoff analysis, measurement of surface water flow, unit hydrograph analysis, hydrologic statistics and probability theory, hydrologic routing, computer models in surface hydrology and their application.