Master in Desert Farming Techniques and Soilless Agriculture

Program Outline

The Master of Science is a two-year program organized in 4 semesters (16 weeks duration each). Shared core courses (minimum 5 credit hours), program specialized courses (minimum 16 credit hours) and elective courses (maximum 7 credit hours). A thesis equivalent to 8 credit hours must be completed, approved by the examination committee of internal and external examiners before the final oral evaluation. The courses selection and research project is determined through consultation with supervision committee and approved by the Center's Council.

The specialized courses offered in the third semester are also available for Master students as recommended by the supervision committee and the approval of the Center's Council. Elective courses can be selected from the sphere of Technological Studies upon recommendation by the supervision committee and approval of the Center's Council.

Outline of Courses

A. Shared Courses

Course code	Course title	Credit hours
GSTS 510	Scientific Writing	1
GSTS 520	Research Methods	2
NREES 620	Climatology & Climate Change	2

B. Specialized Courses

Course code	Course title	Credit hours
NREDF 533	Soil Science	3

NREDF 631	Agroclimatology & Crop Water Requirements	3
NREDF 620	Greenhouse Design & Management	2
NREDF 5*9	Lab and Field Case Studies	2
NREDF 521	Crop Production	2
NREDF 510	Seminar	1
NREDF 531	Organic Farming	3
NREDF 524	Integrated Pest Management	2
NREDF 525	Waste Water Use in Agriculture	2
NREDF 632	Integrated Land Management	3
NREDF 530	Management of Saline & Sodic Soils	3
NREDF 527	Water Saving Techniques in Agriculture	2
NREDF 523	Design & Analysis of Experiments	2
NREDF 6*9	Lab & Field Case Studies	2
NREDF 534	Soilless & Hydroponics Agriculture	3
NREDF 610	Seminar	1
NREDF 532	Soil Fertility & Fertilizers	3
NREDF 633	Plant Ecophysiology	3
NREDF 630	Agricultural Landscape	3
NREDF 526	Water Harvesting Techniques for Agricultural Production	2

NREDF 520	Agricultural Economics & Agribusiness	2
NREDF 522	Desertification	2
NREDF 680	Master Thesis	8

*NREDF 5*9/6*9 Lab, Field & Case Studies the * represent 1 to 4 credit hours (not to exceed 4 credit of total credit hours taken towards a degree

Courses description

NREDF 5*9/6*9	Lab, Field Case Studies	1 to 4 CR
These are special cases relevant to the student area of research or specialization that are not covered by courses. It is mainly directed to allow the supervisor to develop certain experiences and computational skills towards fulfilling the main study objectives. It can be assigned to an individual or a group of students. It shall not exceed 4 Cr. Hr of total hours taken towards a degree		
NREDF 510/614	**Seminar**	**1 CR**
A student may research or investigate a topic, and exchange results with other students through the presentation, reports, and discussions under the supervision of a faculty member.		
NREDF 520	**Agricultural Economics and Agribusiness**	**2 CR**
elements of agricultural production and distribution, the interdependence of various sectors within the production chain, production costs, supply and price determination; competition, and marketing and innovation.		
NREDF 521	**Crop Production**	**2 CR**
Basic knowledge for the production of different crops with emphasis on vegetable, ornamental medicinal and forage crops. Methods of land preparation, application of fertilizers and irrigation water and selection of suitable varieties in addition to crop harvesting and post-harvesting treatments.		
NREDF 522	**Desertification**	**2 CR**

Definition of desertification and desert encroachment. Understanding the desertification phenomenon through various case studies on the degradation of natural resources and agricultural production systems. With an emphasis on indicators of desertification and its effects on the environment and socioeconomic dimensions. Desert combat methods, in addition to strategies and plans to combat desertification from an institutional point of view and discussion of medium environmental impact assessment results on the desertification phenomenon.		
NREDF 523	**Design & Analysis of Experiments**	**2 CR**
Student learns the basic concepts of experimental design with emphasis on the significant designs: completely randomized designs, randomized block designs, factorial design and correlation and regression. Hands-on statistical software applications with emphasis on JMP software. A student should be able to choose the appropriate design statistically analyze the data using JMP software.		
NREDF 524	**Integrated Pest Management**	**2 CR**
Definition of integrated pest management, major insect pests in GCC region, biological control methods, pesticide types, mode of action, and control rates, resistant plant varieties, the role of crop rotation and soil management.		
NREDF 525	**Waste Water Reuse in Agriculture**	**2 CR**
Definition of wastewater, wastewater resources, constituents, wastewater quality indicators, gray water, black water, wastewater treatment, bioremediation, wastewater reuse in agriculture and landscaping.		
NREDF 526	**Water Harvesting Techniques for Agricultural Production**	**2 CR**
Definition of water harvesting, Macro and micro-water harvesting techniques, soil physical properties affecting WH, design, and maintenance of WH systems.		
NREDF 527	**Water Saving Techniques in Agriculture**	**2 CR**
Improvement of irrigation methods under desert soils and climate and the determination of irrigation efficiencies using deficit irrigation and the effects of water deficit at different growth		

stages in addition to the relationship between the evapotranspiration deficit and yields with methods of reducing water conveyance losses at farm level.		
NREDF 530	**Management of Saline/Sodic Soils**	**3 CR**
saline soils, sodic soils, their definition and extent, the effect of salinity and sodicity on plants, salinity tolerance in plants, reclamation of saline and sodic soils.		
NREDF 531	**Organic Farming**	**3 CR**
Understanding soil fertility, essential nutrients for plant growth, diagnoses of nutrient deficiencies in plants, organic fertilizers and application methods, nutrient use efficiency in dry environments. Introduction to Organic Farming, Integrated Farm Management Systems, Organic Soil Management, and Crop Nutrition, Selection and application of appropriate pest and disease management practices for both animal and plant production on an organic farm, Design an appropriate system for organic production of cattle and sheep, certification of organic farms.		
NREDF 532	**Soil Fertility & Fertilizers**	**3 CR**
Understanding soil fertility, essential nutrients for plant growth, diagnoses of nutrient deficiencies in plants, fertilizers, fertilizer application methods, nutrient use efficiency in dry environments.		
NREDF 533	**Soil Science**	**3 CR**
Definition of soils, soil-forming factors, factors affecting soil formation. Soil physical and chemical properties, desert soils with special reference to GCC soils. Management of soils. In addition to hazards of soil pollution and management for sustainable production as well as its importance in supporting biological diversity.		
NREDF 534	**Soil-less & Hydroponics Agriculture**	**3 CR**
Definition of soilless culture, systems of hydroponic production, nutrient solutions, management of crops in the greenhouse, greenhouse structures, management of irrigation and nutrient systems.		

NREDF 610	Seminar	1 CR
A student may research or investigate a topic, and exchange results with other students through the presentation, reports, and discussions under the supervision of a faculty member.		
NREDF 620	**Greenhouse Design and Management**	**2 CR**
Types of greenhouses and its management. Main features and considerations for greenhouse design. The scientific basis of evaporative cooling systems and its suitability under desert climate. Automation of internal temperature, light, irrigation water, and Fertigation.		
NREDF 630	**Agricultural Landscape**	**3 CR**
Landscaping classes introduce students to landscaping terminology, garden design, horticultural skills, and landscape construction. Students learn about plant selection for different conditions, soil preparation, irrigation systems, and landscape drawing and design.		
NREDF 631	**Agro-climatology and Crop Water Requirements**	**3 CR**
Basic concepts about the main weather parameters that affect crop production. Reliability of climatic data. CropWat and ClimWat programs for the estimation of reference crop evapotranspiration. Methods and instruments for the measurement of the main weather parameters. Determination of the length of the season and effective rainfall. Evaporation from a free water surface, wet soil, and evapotranspiration as affected by weather parameters.		
NREDF 632	**Integrated Land Management**	**3 CR**
Strategically planned approach to managing and reducing the human-caused footprint on the public land. Managing public lands and associated natural recourses, reclamation of disturbed lands.		
NREDF 633	**Plant Ecophysiology**	**3 CR**

This course is concerned largely with mechanisms of how plants sense and respond to environmental change and how the responses to highly variable conditions are coordinated with one another, and how their collective effect on plant growth and gas exchange can be understood.		
NREDF 680	**Master Thesis**	**8 CR**
After successful completion of at least 28 credit hours the student is expected to prepare and present a Thesis that reflects his understanding of the subject matter, competence in theoretical and practical knowledge, utilization of scientific references, application of available technologies, scientific contribution to the subject matter in terms of analysis understanding and development. The ability to scientifically present his findings formulates conclusions and recommendations.		