



**Jordan University of Science and Technology**  
**Faculty of Agriculture**  
**Natural Resources & Environment Department**

NR412 Soil Fertility And Fertilizers

Second Semester 2022-2023

**Course Catalog**

3 Credit Hours. Soil chemical and physical properties as related to soil fertility. Plant nutrients and their classification, functions, soil and plant contents, reactions and availability in the soil. Movement and absorption of plant nutrients. Fertilizers classification, types and application methods. Soil fertility evaluation and fertilizer recommendations. Fertigation and advanced techniques in fertilizer applications. (Prerequisite: NR 312, PP 205)

**Text Book**

<b>Title</b>	Soil Fertility and Fertilizers, An introduction to Nutrient Management.
<b>Author(s)</b>	John L. Havlin, Samuel L. Tisdale, Werner L. Nelson, James D. Beaton
<b>Edition</b>	7th Edition
<b>Short Name</b>	Soil Fertility
<b>Other Information</b>	

**Instructor**

<b>Name</b>	<b>Prof. Munir Al Rusan</b>
<b>Office Location</b>	C4L2
<b>Office Hours</b>	
<b>Email</b>	mrusan@just.edu.jo

**Class Schedule & Room**

Section 1:  
Lecture Time: Mon, Wed : 08:30 - 10:00  
Room: C5020

**Tentative List of Topics Covered**

<b>Weeks</b>	<b>Topic</b>	<b>References</b>
Week 1	Introduction: Soil fertility; Soil productivity	<b>Chapter 1</b> From <b>Soil Fertility</b>
Week 2	Growth and the factors affecting it: Factors affecting plant growth; Growth expressions	<b>Chapter 2</b> From <b>Soil Fertility</b>
Week 3	Plant nutrients: Essentiality and classification of plant nutrients; Definitions (deficient, insufficient, excessive, toxic, competition, antagonism, synergism)	<b>Chapter 3</b> From <b>Soil Fertility</b>
Weeks 4, 5	Basic soil- plant relationships: Anion and cation exchange; Contact exchange; Root cation exchange	<b>Chapter 4</b> From <b>Soil Fertility</b>
Weeks 6, 7	Movement of ions from soils to roots: Mechanisms; cell membrane and ion absorption mechanisms by roots	<b>Chapter 4</b> From <b>Soil Fertility</b>
Week 8	Soil and nitrogen fertilizers: N cycle; Soil N; Plant N; N fertilizers; Environmental concern	<b>Chapter 5</b> From <b>Soil Fertility</b>
Week 9	Soil and phosphorus fertilizers: P cycle; Soil P; Plant P; P fertilizers; Environmental concern	<b>Chapter 6</b> From <b>Soil Fertility</b>
Week 10	Soil and potassium, sulfur, calcium, magnesium: Soil K and S; Plant K and S; K and S fertilizers	<b>Chapter 7 &amp; 8</b> From <b>Soil Fertility</b>
Weeks 11, 12	Soil and micronutrients: Soil and plant contents; Fertilizers micronutrients	<b>Chapter 9</b> From <b>Soil Fertility</b>
Week 13	Soil acidity and basicity, acid and salt-affected soils: Origin and sources of soil salinity; Classification; reclamation and management	<b>Chapter 10</b> From <b>Soil Fertility</b>
Week 14	Soil fertility evaluation	<b>Chapter 11</b> From <b>Soil Fertility</b>
Weeks 15, 16	Fundamental of fertilizer application: Methods of application; Advanced techniques of fertilizer application and fertigation	<b>Chapter 12</b> From <b>Soil Fertility</b>

<b>Mapping of Course Outcomes to Program Outcomes</b>	<b>Course Outcome Weight (Out of 100%)</b>	<b>Assessment method</b>
How to distinguish between soil fertility and soil productivity and how to manage or control factors affecting both fertility and productivity of the soil [10PLO1, 10PLO2, 20PLO3, 10PLO4, 20PLO5, 20PLO6, 10PLO7]	10%	
Know the Soil physical and chemical properties that affect availability of nutrients in the soil, and learn how to consider these properties for optimizing fertilizer management [15PLO1]	15%	
Know classification of nutrients based on various categories according to the objectives of the classification. Besides, they will learn terminology related to status of the nutrients in the plant tissues [15PLO1]	15%	
Understand nature, behavior and availability of the native nutrients in the soil; how they interact with agricultural crops; how to consider these data to make the right decision on which nutrients should be added [10PLO1, 10PLO2, 10PLO4]	30%	

Understand how to manage and/or reclaim acid soils and salt affected soils (both saline and sodic soils). How to optimize both crop and soil management to successfully use these types of soil without further degradation of the soil [10PLO9]	10%	
Learn how to evaluate soil fertility based on visual observations, soil chemical testing and plant tissue analyses. How to make representative samples and how to prepare them for analysis and make fertilizer recommendations based on the results of the analysis [10PLO7]	10%	
Learn about the most popular methods of fertilizer application; when, where to place and how to implement each method. They will also learn how to select the best type, form of fertilizers for various soil and crop conditions [10PLO6]	10%	

Relationship to Program Student Outcomes (Out of 100%)								
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
41	11	2	11	2	12	11		10

Evaluation	
Assessment Tool	Weight
Mid Term Exam	50%
Final Exam	50%

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