

# SOIL RECLAMATION NR 414

*Jordan University of Science and Technology*

*Faculty : Agriculture*

*Department: Natural Resources and The Environment*

*Place:*

*Time:*

*Office: CIL2*

*Instructor: Dr. Mamoun Gharaibeh*

## **General Course Objectives:**

This class is designed to introduce students to

- Arid and semi-arid regions. distribution, salinity, sources and formation.
- Salinity and Its Effect on Soils, Quality of Water and Plant Growth.
- Soil Reactions in Saline and Sodic Soils.
- Chemical and physical characterization of accumulated salts.
- Sodification and Alkalinization.
- Chemical Characterization of Saline and Sodic Soils.
- Soil Reclamation and Management of Saline and Sodic Soils.
- Hazard of Salinity and Sodicity. Sodium adsorption ratio (SAR), exchangeable
- Sodium percentage (ESP), electrical conductivity (EC).....
- Soil water movement, water tension, soils in relation to water quality, and types of salts.

**PREREQUISITES:** Freshman Chemistry (1<sup>st</sup> year ), Soil Chemistry

**Eligibility:** The course is required for undergraduates/ graduates students in the department of natural resources and the environment.

**Text:** Water Quality for Irrigation, Soil Chemistry (Bohn), Notes

**Exams:** 2 Midterm Exams (50%) + Final Exam (40%)

**Home work :** 10%

## SEMESTER OUTLINE

- ✓ Introduction, Units of measurements
- ✓ Concepts of land reclamation
- ✓ Limiting factors for land productivity
- ✓ Salt affected soils
  - (Cycles of salt accumulation, Sources of salt accumulation, Mechanisms of salt transportation, Factors-Environment for salt accumulation and distribution )
- ✓ Water-Salt balance
- ✓ Chemical and Physical properties of accumulated salts
  - (Types and chemical formulas, Carbonates, Sulfates, Chlorides, Nitrates, Borates)
- ✓ Solubility of salts
  - (Activity and activity coefficient, Common ion effect, Salt effect)
  - Ion exchange equations
  - Sodium Adsorption Ratio (SAR)
  - Exchangeable Sodium Percentage (ESP)
  - Salinity
    - (Methods to express salinity, Extraction methods of soil solution, Total Dissolved Solids (TDS), Electrical Conductivity (EC), TDS-EC-OP relations, Classification of salt affected soils, US classification, Russian classification, FAO classification)
- ✓ Chemical and physical properties of saline-sodic soils
- ✓ Effect of salts on plants
  - (Tolerance classification, Halophytes, Glycophytes, Direct effects of salinity, Indirect effect of salinity)
- ✓ Evaluation of crop tolerance (salt tolerance)
  - (Salinity tolerance, Sodium tolerance, Boron tolerance)
- ✓ Irrigation water quality
  - (Quality determination, EC-SAR, Boron, Bicarbonates -alkalinity)
- ✓ Classification of irrigation waters
  - (Salinity hazard, Sodicity hazard)
- ✓ Reclamation of salt affected soils
  - (Methods, principles, Leaching requirements, Reclamation of sodic soils Amendments, Gypsum requirements)
- ✓ Reclamation of sandy, heavy soils
- ✓ Reclamation of calcic and gypsic soils