

**Faculty:** Faculty of Agriculture  
**Department:** Department of Land, Water and Environment

<b>COURSE TITLE</b>	Irrigation Systems Design	<b>COURSE CODE:</b> 0604722
<b>LECTURER (s)</b>	Prof. Muhammad Shatanawi	Email: shatanaw@ju.edu.jo
<b>Credit</b>	3	<b>PRE-REQUISITE (s):</b> Graduate Level
<b>DURATION OF COURSE</b>	16 weeks, 3 hours per week	

**OBJECTIVES:**

The main objectives of the course:

1. provide the students with basic data that are needed for selection and design of sprinkler and micro irrigation systems;
2. be able to select the suitable system under the local conditions;
3. perform the design steps of typical irrigation systems; and
4. carryout economical evaluation and system performance;

**INTENDED LEARNING OUTCOMES:**

*Subject specific skills:*

At the end of the course, the students will be able to:

1. determine the pre-design steps required for the design of irrigation systems;
2. select the suitable system of irrigation under different conditions;
3. understand and identify the different types of sprinkler irrigation;
4. select the best layout of set sprinkler systems;
5. understand the hydraulics of pipelines, manifolds, sprinkler heads and pumps;
6. design laterals, mainlines for set sprinkler systems;
7. design of center-pivot, linear-move and traveling gun systems;
8. carry out economic analysis for different alternatives and select the best system;
9. understand the types and components of micro irrigation systems;
10. select emitters and understand design criteria;
11. design of trickle lateral manifold and mainline; and
12. comprehend clogging problems and use suitable filtration systems.

*Core academic skills:*

The main academic skill is to gain a system of thoughts patterns leading to the comprehensive selection and design of various types of pressurized irrigation systems.

*Personal key skills:*

Upon completion this course, the student is expected to:

1. know the steps in the design of typical irrigation systems;
2. perform design analysis of different alternatives and select the best one;
3. to draw a system layout for both sprinkler and trickle irrigation systems; and
4. to prepare a list of material and tender document.

**LEARNING/TEACHING METHODS**

Lecturers, exercises, homeworks, projects and individual seminars.

**ASSIGNMENTS AND COURSE EVALUATION:**

First exam: 20%

Homework: 10%

Sprinkler irrigation project: 15%

Trickle irrigation project: 15%

Final Exam: 40%

**SYLLABUS PLAN**

Week	Subject
1 /	Introduction: Soil-water-plant relationship, review of pipeline hydraulics, hydraulics of manifolds.
2	Pre-design calculation for pressurized irrigation systems, overview of sprinkler and trickle systems.
3	Types of sprinkler systems, planning factors for sprinkler systems, layout of sprinkler systems.
4	Design of set sprinkler lateral, pressure requirements, and sprinkler heads selection.
5	Pumping and power selection.
6	Design of traveling sprinkler systems.
7	Design of center pivot systems.
8	Design of linear move systems.
9	Main delivery system design, economics of pipes selection.
10	Types and components of a trickle system, trickle irrigation planning factors.
11	Emitters' selection and design criteria.
12	Trickle system design strategy, design of laterals.
13	Design of manifolds and mainlines.
14, 15	Selection and design of head unit.

**References:**

1. Keller, J. and R. Bliesner. (1990). Sprinkler and Trickle Irrigation, VNR, New York,.
2. Cuenca, R. H. (1989). Irrigation System Design: an engineering approach, Prentice-Hall, Englewood Cliffs, N. J.
3. FAO paper # 36. Localized Irrigation.
4. James, Larry. (1986). Principle of Farm Irrigation System Design, Wiley.
5. Selected paper.
6. Selected catalogues of major irrigation products.