**The University of Jordan**

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

**Program: 2013-2014/First Semester**

**Course title: Irrigation Systems and Design (634311)**

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| **Credit hours** | **3** | **Level** | **Fourth year** | **Pre-requisite** | **Principles of Irrigation (604103)**  **Applied Hydraulics (604211)** |
| **Coordinator/ Lecturer** | **Dr. Ahmad M. Abu-Awwad** | **Office number** | **114** | **Office phone** | **22464** |
| **Course website** | **On UJ E Learning portal** | **E-mail** | **abuawwad@ju.edu.jo** | **Place** | **LWE Seminar Room** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Office hours** | | | | | |
| **Day/Time** | **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
| **Day** | **\*** | **\*** | **\*** | **\*** | **\*** |
| **Time** | **9-11** | **10-12** | **9-11** | **10-12** | **9-11** |

**Course Description**

Design of gravity and pressurized irrigation systems, introduction to surface irrigation concept, components, evaluation; design of surface irrigation systems, sprinkler irrigation, trickle irrigation, irrigation pumps.

**Learning Objectives**

Students will:

* Have an understanding of the common types of irrigation systems and how they function.
* Have an understating of hydraulics principles and how they apply to irrigation systems.
* Demonstrate the ability to apply knowledge of irrigation systems to evaluate irrigation systems.
* Be able to correctly identify common tools, equipment, and materials used in the irrigation.
* Demonstrate the ability to design a field-scale surface irrigation, sprinkler irrigation and trickle irrigation systems.
* Develop design specifications for surface, sprinkler and trickle irrigation application systems and their operation.
* Develop design specifications for irrigation pumps.

**Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding:** Student is expected to

**A1-** Understanding of the common types of irrigation systems and how they function.

**A2-** Understating of hydraulics principles and how they apply to irrigation systems.

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to

B1- Demonstrate the ability to apply knowledge of irrigation systems to evaluate irrigation systems.

B2- Be able to correctly identify common tools, equipment, and materials used in the irrigation

B3- Demonstrate the ability to design a field-scale surface irrigation, sprinkler irrigation and trickle irrigation systems.

**C. Subject- Specific Skills:** Students is expected to

C1- Develop design specifications for surface, sprinkler and trickle irrigation application systems and their operation

C2- Develop design specifications for irrigation pumps.

**D. Transferable Key Skills:** Students is expected to

D1- Be able to design efficient gravity and/or pressurized irrigation systems that minimize cost and attain design uniformity.

D2- Be able to evaluate irrigation system performance.

# ILOs: Learning and Evaluation Methods

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| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| **A. Knowledge and Understanding** | **Lectures and Discussions** | **Exam** |
| **B. Intellectual Analytical and Cognitive Skills** | **Lectures and Discussions** | **Exam** |
| **C. Subject- Specific Skills** | **Lectures and Discussions** | **Exam** |
| **D. Transferable Key Skills** | **Homework and Assignments** | **Evaluation** |

**Course Contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Content** | **Reference** | **Week** | **ILO/s** |
| Syllabus Review/Introduction  Irrigation Efficiency: Extraction, Conveyance, Application, and Distribution pattern efficiency | Chapter 6. Irrigation System Design. An Engineering Approach. 1989 by Prentice Hall, Englewood Cliffs, New Jersey 07632.  Internet review | 1st week | A1 |
| Definitions of surface system terms. Phases of water distribution over soil. | = | 2nd week | A1, A2 |
| Furrow system design. | = | 3rd week | B1- C3 |
| Furrow system design continues. | = | 4th week | B1- D2 |
| Hydraulic Relationships | = | 5th week | A1,A2 |
| Introduction to Sprinkler system design. Types. Advantages and disadvantages, .. | Chapter 7.  Internet review | 6th week | A1 |
| Uniformity of application. Adequacy of application concept | = | 7th week | A1, B1 |
| Component of system design: application rate, sprinkler and lateral spacing. Nozzle selection criteria | = | 8th week | B1-C3 |
| System Capacity. Distribution system design and layout concept of lateral design. Lateral layout | = | 9th week | B1-C3 |
| Pressure required at mainline entrance to lateral. Critical pressure requirement on mainline. Pressure required at the pump. | = | 10th week | B1-C3 |
| Sprinkler system design review and pump selection. | Chapter 7 and 9 | 11th week | B1-D2 |
| Trickle system design: concept of trickle system. System components. | Chapter 8  Internet review | 12th week | A1, A2 |
| Type of emitters. Emitter uniformity | = | 13th week | A1-B2 |
| Lateral hydraulics governing relationships | = | 14th week | B1-C3 |
| Filtration and water treatment systems. Fertilizer injector systems. | Chapter 8 and 9 | 15th week | A1, A2 |
| Trickle system design review and pump selection. Final Exam | = | 16th week | B1-D2 |

**Learning Methodology**

## The course will be structures mainly in Lectures; and discussions, exercise, demonstration, and applications.

# Evaluation

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| --- | --- | --- |
| **Evaluation** | **Point %** | **Date** |
| **Midterm Exam** | 30 | 5 / 11 / 2013 |
| **2nd Exam** | 20 | 5 / 12 /2013 |
| **Homework an Quizzes** | 10 | Bonus |
| **Final Exam** | 50 | 12 / 1 / 2014 |

**Main Reference/s:**

* Irrigation System Design. Richard H. Cuenca. Prentice Hall, Inc. 1989.

# References:

* Sprinkle and Trickle Irrigation*by J. Keller and R. Bliesner (1990)*
* Internet

**Intended Grading Scale (Optional)**

0-35 **F**

36-39 **D**-

40-47 **D**

48-51 **D+**

52-55 **C**-

56-63 **C**

64-67 **C+**

68-71 **B**-

72-79 **B**

80-83 **B+**

84-87 **A**-

88-100 **A**

**Notes:**

* Concerns or complaints should be expressed in the first instance to the module lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the module coordinator (for multiple sections) who will take the concerns to the module representative meeting. Thereafter, problems are dealt with by the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints, there will be a committee to review grading the final exam.
* For more details on University regulations please visit:

<http://www.ju.edu.jo/rules/index.htm>