**The University of Jordan**

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

**Program: 2015-2016/First Semester**

**Course title: Surface Irrigation (604907)**

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| **Credit hours** | **3** | **Level** | **Ph.D** | **Pre-requisite** | **Principles of Irrigation (604103)****Applied Hydraulics** **(604211)** |
| **Coordinator/ Lecturer** | **Prof. 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** |

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| --- |
| **Office hours** |
| **Day/Time** | **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** |
| **Day** | **\*** | **\*** | **\*** | **\*** | **\*** |
| **Time** | **10-12** | **11-2** | **10-12** | **11-2** | **10-12** |

**Course Description**

The course covers a brief review of basic soil-water relationships, basics of volume-balance design and evaluation, field measurement techniques, and operation and maintenance are covered in details

**Learning Objectives**

Students will:

* Have a working knowledge of the pros and cons of different types of surface irrigation systems.
* Demonstrate the ability to design and evaluate field-scale surface irrigation systems.
* Demonstrate the ability to integrate surface irrigation designs into the operational requirements of irrigation projects.

**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 basic soil-water relationships.

**A2-** Understanding of the common types of surface irrigation systems and how they function.

**A3-** Understating of volume-balance principles and how they apply to surface irrigation systems.

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

B1- Demonstrate the ability to apply knowledge to evaluate furrow, border and basin surface 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 furrow, border and basin surface irrigation systems.

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

C1- Develop design specifications for furrow, border and basin surface and their operation

C2- Develop design specifications for volume balance field measurements techniques.

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

D1- Be able to design efficient furrow, border and basin surface systems that minimize cost and attain design uniformity.

D2- Be able to evaluate surface irrigation systems performance.

# ILOs: Learning and EvaluationMethods

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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/The practice of Irrigation: IntroductionObjectives, selections, advantages and disadvantages of surface Irrigation | * Chapter 1. Surface Irrigation Theory and Practices, 1987. and
* Chapter 6. Irrigation System Design. 1989.
* Internet review
 | 1st week | A1 |
| The irrigation requirement: water balance, soil characteristics, crop water requirements, irrigation efficiency and uniformity.Examples and HW problems. | Chapter 2. Surface Irrigation Theory and Practices, 1987. | 2nd week | A1, D2 |
| Surface irrigation systems: types of surface irrigation systems, water supply and management, and structural elements | Chapter 3. Surface Irrigation Theory and Practices, 1987. | 3rd week | A1 |
| Field measurement techniques: flow measurements, irrigation events, infiltration, soil water, example and HW problems. | Chapter 4. Surface Irrigation Theory and Practices, 1987. | 4th week | C2, D2 |
| Evaluation of the field system: objectives of evaluation, inflow-outflow, advance and recession, and advance-surface storage,  | Chapter 5. Surface Irrigation Theory and Practices, 1987. | 5th week | B1, D2 |
| Infiltration: adjusted infiltration approach, infiltration from advance data, evaluation the infiltration parameters, evaluating the basic intake rate | = | 6th week | B1, B2, D2 |
| Irrigation system performance: Furrow irrigation evaluation, border irrigation evaluation, basin irrigation evaluation  | = | 7th week | B2, D2 |
| Alternative for improving hydraulic performance: modify hydraulic conditions include discharge, time of cutoff, length of run, topography, time of advance, infiltration, tail-water runoff and deep percolation | = | 8th week | C2, D2 |
| Example problems and Home Works | = | 9th week | A2, A3, B1, D2 |
| Detailed design: land leveling, flow rate and time of application; alternative for volume balance; common design computations: Intake opportunity time, Advance time | Chapter 6. Surface Irrigation Theory and Practices, 1987. | 10th week | A3, B3 |
| Furrow irrigation design: furrow procedure for systems without cutback or reuse. Cutback furrow design procedure. Design of furrow systems with tail-water reuse, integration with water supply. | = | 11th week | B3, C1, C2, D1 |
| Border irrigation design | = | 12th week | B3, C1, C2, D1 |
| Basin irrigation design | = | 13th week | B3, C1, C2, D1 |
| Example problems and HW | = | 14th week | B3,C1, C2, D1 |
| = |  | 15th week | B3,C1, C2, D1 |
| = | = | 16th week  | B3,C1, C2, D1 |

**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 | 11 / 11 / 2015 |
| **2nd Exam** | 15 | 9 / 12 /2015 |
| **Homework an Quizzes** | 15 |  |
| **Final Exam**  | 40 | 6 / 1 / 2016 |

**Main Reference/s:**

* Surface Irrigation Theory and Practices. Wynn R. Walker and Gaylord V. Skogerboe.1987 by PRENTICE- Hall, INC.

# References:

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