**The University of Jordan**

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

**Program: 2014-2015/First Semester**

**Course title: Irrigation Theory (0604704)**

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| **Credit hours** | **3** | **Level** | **MSc** | **Pre-requisite** | **Principles of Irrigation (604103)** |
| **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** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 crop water requirements and corresponding procedures for estimation; irrigation systems characteristics and performance; data collection, review and evaluation; agriculture production system; project planning and design.

**Learning Objectives**

Students will:

1. Develop a complete understanding of basic plant-soil-water relationships.
2. Develop a working understanding of crop water requirements and corresponding procedures for estimation.
3. Review general irrigation system types, characteristics, and performances.
4. Review data requirements and procedures for data measurement as used in consumptive use and soil parameter estimation.
5. Develop the ability to synthesize the above skills into irrigation systems and project planning.

**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 agriculture production systems.

**A2-** Understanding of the irrigation systems.

**A3-** Understanding of the needed data for crop water requirement estimation, irrigation systems, and project planning.

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

B1- Demonstrate the ability to apply knowledge to review and evaluate input climatic weather data.

B2-Be able to correctly identify and apply the appropriate method for crop water requirement.

B3-Demonstrate the ability to optimize the use of irrigation water, cropping pattern, and irrigation system.

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

C1- Develop cropping pattern and irrigation water demands (crop evapotranspiration, irrigation efficiency, leaching requirement, etc.).

C2- Develop soil water budget, irrigation scheduling and management

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

D1- Be able to synthesize the above skills into irrigation system and project planning.

D2- Be able to design and develop agriculture project on large scale.

# 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** |
| Introduction, importance of irrigation, agriculture production systems, irrigation system elements.  Chapter 1: Introduction to Evapotranspiration | * Chapter 1.FAO Paper 56, 1998 * Literature and Internet review | 1st week | A1 |
| System planning and design process, Grean-Ampt, Kostikov infiltration equations, SCS intake families, field data analysis.  Chapter 2: FAO Penman-Montieth equation | * Chapter 2.FAO Paper 56, 1988 * Literature and Internet review | 2nd week | A1, A3 |
| Introduction to evapotranspiration and energy balance equation.  Chapter 3: Meteorological data | * Chapter 3.FAO Paper 56, 1988 * Literature and Internet review | 3rd week | B1 |
| Evapotranspiration estimation, selected methods for calculating ETr, Kc and adjustment.  Chapter 4: Determination of Eto | * Chapter 4.FAO Paper 56, 1988 * Literature and Internet review | 4th week | C1, C2 |
| Energy balance equation, derivation of Penman-Montieth equation.  Chapter 5: Introduction to Crop Evapotranspiration | * Chapter 5.FAO Paper 56, 1988 * Literature and Internet review | 5th week | D1 |
| Reference evapotranspiration: FAO Penman, Jensen-Haise, FAO radiation, SCS BlaneyCridlle, FAO BlaneyCriddle.  Chapter 6: Single crop coefficient | * Chapter 6.FAO Paper 56, 1988 * Literature and Internet review | 6th week | B2, D1 |
| Chapter 7: Dual Crop coefficient | * Chapter 7.FAO Paper 56, 1988 | 7th week | B2, D2 |
| Chapter 8: Etc under soil water stress conditions | * Chapter 8.FAO Paper 56, 1988 | 8th week | B3, C1 |
| Chapter 9: Etc for Natural, non-typical and non-pristine | * Chapter 9.FAO Paper 56, 1988 | 9th week | A3,B2, D1 |
| Chapter 10: Etc- Under various management practices | * Chapter 10.FAO Paper 56, 1988 | 10th week | C2, D2 |
| Chapter 11: Etc- During none growing season | * Chapter 11.FAO Paper 56, 1988 | 11th week | B3, C2, D2 |
| Peak Requirements, irrigation scheduling, root growth, water budgets, real time scheduling. | Literature and Internet review | 12th week | D1, D2 |
| ET reference method comparisons, Calculation | = | 13th week | C1, C2,D1, D2 |
| Penman Montieth calculation (excel sheet) | = | 14th week | = |
| = | = | 15th week | = |
| = | = | 16th week | = |

**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 / 2014 |
| **2nd Exam** | 15 | 9 / 12 /2014 |
| **Homework an Quizzes** | 15 |  |
| **Final Exam** | 40 | 6 / 1 / 2015 |

**Main Reference/s:**

1. Crop evapotranspiration - Guidelines for computing crop water requirements, FAO Irrigation Drainage Paper 56. FAO- Food and Agriculture Organization of the United Nations. Rome, 1998

# References:

* Lectures
* 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>