

PRGR669- Green Agriculture & Irrigation Systems

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Office Hours: TTH 9:30 – 10:30 AM

Overview of the Course

This course covers the water requirements of plants, irrigation scheduling, soil moisture and ET sensors, modern irrigation systems: micro-sprinkler systems, drip systems, irrigation efficiency, and energy demands of irrigation systems, smart irrigation, and controllers, and use of renewable energy for irrigation. Topics covered include the role of soil water content in irrigation, evapotranspiration in relation to green agriculture and smart irrigation and agricultural and landscape water requirements. Students will be introduced to different irrigation systems and to the implementation of controllers in smart irrigation.

Credit Hours **(3cr)**

Course Prerequisites

- Prior knowledge in a science/engineering discipline.

Course Goals

The course aims at providing students with quantitative methods for determining plants water requirements in both agricultural fields and landscape areas. Students shall work on different approaches to measure the soil water content, to estimate the crop evapotranspiration, and to design the irrigation schedule (when and how to irrigate). Students will approach the issue of green agriculture and smart irrigation when engaging modern irrigation systems and be aware of the role of controllers in smart irrigation.

Course Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Explain the principles and equipment used to measure soil water content
2. Understand the soil-plant-water relationships
3. Identify evapotranspiration calculation process and use the available models to estimate it in agricultural fields and landscape areas
4. Use software for the calculation of crop water requirements
5. Calculate irrigation rates and irrigation efficiency
6. Determine an irrigation schedule for a system
7. Identify key components of an irrigation system and their function
8. Give the advantages and disadvantages of the different irrigation methods

Topics Covered

- Distribution of irrigation areas in the world
- Soil-plant-water relationships
- Evapotranspiration in relation to green agriculture and smart irrigation
- Plants water requirements in agricultural fields and landscape areas
- Irrigation scheduling
- Irrigation systems
- Smart controllers

Texts and Supplementary Materials

Required Text

- No textbooks are required. All required reading material is available through the modules.

Technical Requirements

- You would need a computer running Windows 7 or later, having a spreadsheet and a word program, along with the following software that you need to download and install when you register for this class:
- REF-ET:
<https://www.uidaho.edu/cals/kimberly-research-and-extension-center/research/water-resources/ref-et-software>

Grading Policy

The grades in this class break down as follows:

Assignments	70 pts
Online Quizzes	30 pts
Total Points	100 pts



Disability:

“If you have a documented special needs and anticipate difficulties with the content or format of the course due to a physical or learning disability, please contact me and/or your academic advisor, as well as the Counseling Center in the Office of Student Affairs (x3196), as soon as possible to discuss options for accommodations. Those seeking accommodations must submit a [Special Needs Support Request Form](#) along with the required documentation.”

Make-up Policy

With the exception of illness requiring hospitalization or the death of an immediate family member, no make-ups for exams will be conducted.

Grading Criteria

	Percent of course grade	Grade Distribution	
Module 1 - Course Introduction	10%	Assignment	70%
		Group Discussion	30%
Module 2 - Soils and Irrigation	10%	Assignment	70%
		Quiz	30%
Module 3 - Evapotranspiration	25%	Assignment	70%
		Quiz	30%
Module 4 - Water Requirements	15%	Assignment	70%
		Quiz	30%
Module 5 - Irrigation Scheduling	15%	Assignment	70%
		Quiz	30%
Module 6 - Irrigation Systems	15%	Assignment	70%
		Quiz	30%
Module 7 - Controllers	10%	Assignment	70%
		Quiz	30%

Tentative Schedule

Module - Topic	Readings	Activity	Module Duration
1 - Course Introduction	<ul style="list-style-type: none"> - Definitions - Growth of vegetation 	<ul style="list-style-type: none"> - Group Discussion - Assignment 1: Irrigation status in different countries and related problems identification 	10 days
2 - Soils and Irrigation	<ul style="list-style-type: none"> - Physical soil characteristics 	<ul style="list-style-type: none"> - Online Quiz - Assignment 2: Calculations of the soil water parameters 	10 days
3 - Evapotranspiration	<ul style="list-style-type: none"> - ET Introduction - ET models - Crop coefficients 	<ul style="list-style-type: none"> - Online Quiz - Assignment 3: ET calculations using the REF-ET software 	15 days
4 - Water Requirements	<ul style="list-style-type: none"> - LCM and WUCOLS - ET adjustment factors - SLIDE rules 	<ul style="list-style-type: none"> - Online Quiz - Assignment 4: Application of WUCOLS and SLIDE methods for landscape water requirements estimation 	10 days
5 - Irrigation Scheduling	<ul style="list-style-type: none"> - Irrigation scheduling: Advantages and methods - How to plan and schedule your irrigation program 	<ul style="list-style-type: none"> - Online Quiz - Assignment 5: Irrigation requirements calculations 	10 days
6 - Irrigation Systems	<ul style="list-style-type: none"> - Types of irrigation systems - Selecting sprinklers - Sprinklers ranges 	<ul style="list-style-type: none"> - Online Quiz - Assignment 6: Drip and sprinkler irrigation design 	10 days
7 - Controllers	<ul style="list-style-type: none"> - Is a smart irrigation controller for you - ET based smart controllers - Irrigation scheduling by ET based controllers - Real time wireless smart sensor 	<ul style="list-style-type: none"> - Online Quiz - Assignment 7: Weather based and soil moisture based controllers specifications and advantages/disadvantages 	10 days