

# PST-1600: IRRIGATION AND DRAINAGE

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## Cuyahoga Community College

**Viewing: PST-1600 : Irrigation and Drainage**

**Board of Trustees:**

December 2021

**Academic Term:**

Fall 2024

**Subject Code**

PST - Plant Science/Landscape Tech.

**Course Number:**

1600

**Title:**

Irrigation and Drainage

**Catalog Description:**

Provides an operational knowledge of the theory, design, installation, and maintenance of landscape irrigation and drainage systems.

**Credit Hour(s):**

2

**Lecture Hour(s):**

1

**Lab Hour(s):**

3

## Requisites

**Prerequisite and Corequisite**

MATH-1190 Algebraic and Quantitative Reasoning, or appropriate Math placement score; or departmental approval.

## Outcomes

**Course Outcome(s):**

Recommend, plan, install, operate, and maintain irrigation and drainage systems.

**Objective(s):**

1. Describe different irrigation methods and equipment components.
2. Describe new methods of storm water management including rain gardens and bioswales.
3. Use an irrigation design to make recommendations to improve the efficiency of an irrigation system.
4. Identify drip, bubble and sprinkler irrigation systems.
5. Troubleshoot, adjust and/or repair irrigation systems.
6. Discuss the basic principles of hydraulics as they relate to irrigation and drainage systems.
7. Operate an irrigation control system.
8. Plot slope and grade using a transit or level to determine need for drainage.
9. Assess the need for a drainage system from slope and grade on a given site.
10. Recommend and plan the proper type of drainage systems.

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**Methods of Evaluation:**

1. Quizzes
2. Midterm

3. Final exam
4. Laboratory exercises

**Course Content Outline:**

1. Irrigation methods and equipment components
  - a. Drip systems
  - b. Bubble systems
  - c. Sprinkler systems
  - d. System components
    - i. definitions
    - ii. functions
    - iii. control systems
    - iv. different types of piping and their characteristics
2. Reading irrigation system plans
  - a. Graphics
  - b. Zoning
  - c. Analysis of water source volume & pressure
  - d. Analysis of water source quality
  - e. Deciding which type of system to use
3. Installation of irrigation systems
  - a. Layout
  - b. Trenching
  - c. Connecting pipe, valves, heads, & controls
  - d. Self-draining systems
  - e. Backfilling
4. Trouble-shooting
  - a. Adjusting spray patterns
  - b. Testing electronics
    - i. adjusting electronics
    - ii. repairing electronics
  - c. Checking valves
  - d. Repairing leaks
5. Hydraulics
  - a. Determining head pressure
  - b. Calculating pressure loss via pipe friction, length & diameter
6. Control systems
  - a. Clocks
  - b. Valves
  - c. Proper wiring
  - d. Relays
  - e. Solenoid valves
7. Irrigation system management
  - a. Programming control systems
  - b. Seasonal maintenance
  - c. Replacement and/or cleaning of spray heads
  - d. Adding zones
8. Plotting slope and grade
  - a. Determining elevation
  - b. Plotting a topographic map
  - c. Transit systems
    - i. optical
    - ii. laser
  - d. Staking out slope
9. Drainage systems
  - a. Assessment of site soil type & texture
  - b. From slope, grade & soil type studies determine need for drainage
  - c. From soil type & texture study determine type, size, spacing & of drainage pipe to be used
10. Different drainage systems

- a. French drains
- b. Standard pipe & gravel
- c. Field tile
- d. Flexible drainage
- e. Rain gardens
- f. Bioswales
- g. Rain barrels
- h. Permeable surfaces

## Resources

Pete Melby. *Simplified Irrigation Design, 2nd Edition*. 2nd. Wiley, 1995.

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Terry Wallace. *The Rain Garden Planner*. Schiffer Publishing, 2008.

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Heather Kinkade-Levario. *Design for Water: Rainwater Harvesting, Stormwater Catchment, and Alternate Water Reuse*. New Society Publishers, 2007.

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Irrigation Association. *Irrigation Contractor Workbook*. Irrigation Association, 2002.

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Irrigation Association. *Landscape Drainage Design*. Irrigation Association, 2000.

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PLANET. *Landscape Training Manual for Irrigation Technicians*. Herndon, VA: PLANET, 2009.

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Irrigation Association. *Irrigation*. 6th ed. Irrigation Association, 2011.

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