Las Positas College
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Course Outline for HORT 60

LANDSCAPE IRRIGATION SYSTEMS

Effective: Fall 2004

I. CATALOG DESCRIPTION:
HORT 60 — LANDSCAPE IRRIGATION SYSTEMS — 3.00 units

Planning, design, engineering, construction, and maintenance of sprinkler and drip irrigation systems for landscape, garden, and turfgrass use. Principles of hydraulics, layout, and equipment application. Irrigation system equipment, components, methods of installation and repair. Principles and techniques of water conservation and plant-water-soil relations.

2.50 Units Lecture 0.50 Units Lab

Grading Methods:
Letter or P/NP

Discipline:

	MIN
Lecture Hours:	45.00
Lab Hours:	27.00
Total Hours:	72.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. apply principles and application of water conservation, management, wise use of water resources;
B. prepare successful, efficient, and sound sprinkler and drip irrigation system designs;
C. install irrigation systems correctly and to current industry standards;
D. implement irrigation system layout, installation, and construction from professionally prepared plans;
E. trouble-shoot irrigation system problems and make necessary repairs;
F. make accurate cost estimates for irrigation system design, installation, and repairs.

V. CONTENT:

A. Irrigation system components
   1. Sprinklers, valves, backflow preventers, other equipment and components
   2. Irrigation controllers
   3. Types of pipe and fittings for sprinkler irrigation systems
B. Application and use of sprinkler irrigation equipment and materials
   1. Equipment and parts assembly
   2. Joining pvc pipe and fittings
   3. 120v and 24v electrical wiring
   4. Controller to valve wiring hookup
   5. Controller and valve operation and function
   6. Sprinkler head types and application/use
   7. Backflow preventers, types and application
   8. Pvc pipe layout, hookup to equipment
C. Sprinkler system design
   1. Basic hydraulics
   2. Concepts of pressure (psi) friction, loss, surge, flow (gpm), velocity of flow
   3. Static pressure vs. Working pressure
   4. Sprinkler head spacing and layout
   5. Backflow preventer, valve and controller location
   6. Main pressure line and lateral line layout
   7. Dividing the system into circuits or zones
   8. Water source and quality
   9. Site and environmental considerations
D. Irrigation system drawings/plans
   1. Equipment and materials required to draw a plan
   2. Measuring the site for developing a plot plan
   3. Information required before designing
   4. Drawing techniques and plan preparation

5. Irrigation system layout methods
6. Information and detail required on the plan

E. Irrigation system management and water conservation
1. Environmental and other factors influencing irrigation
2. Duration, frequency, and depth of irrigation
3. Irrigation methods for specific applications
4. Water loss and evapotranspiration
5. Water requirements for plants
6. Methods and management for water conservation

F. Implementing the design and plan
1. Reading and understanding the plan
2. Layout from the plan to the ground
3. Errors and omissions on the plan
4. Changes in the field

G. Construction and installation
1. Step-by-step method for installation
2. Techniques and details for installation of backflow preventers, valves, and sprinkler heads
3. Joining pvc pipe and fittings
4. Controller installation and electrical hookup
5. Wiring to valves and controller

H. Equipment and materials
1. Selecting equipment and materials
2. Brand names, quality, and cost
3. Sprinkler nozzle selection

I. System operation and testing
1. Main line pressure testing
2. Sprinkler head flushing and adjustment
3. Controller adjustments and timing

J. Sprinkler system maintenance
1. On-going maintenance
2. Repairs to heads, valves, piping, wiring, and controllers
3. Trouble-shooting

K. Drip irrigation equipment and components
1. Equipment and material types
2. Anatomy of a drip irrigation system
3. Drip irrigation system assembly
4. Tubing and pipe
5. Cost of equipment and components
6. Pros and cons of drip irrigation

L. Drip irrigation system hydraulics
1. Pressure and water requirements for drip irrigation
2. Pressure regulation
3. Pressure changes due to elevation
4. Friction loss
5. Filtration and water quality
6. Backflow prevention
7. Flow and gph vs. Gpm
8. Tubing flow loss
9. Pressure and flow calculations

M. Drip irrigation system design
1. Design procedure
2. Project site and environmental data required
3. Plot plan measurements and layout
4. Organizing design criteria
5. Design consideration for slopes
6. Maximum length of run for tubing and pipe
7. Water requirements for plants and evapotranspiration
8. Number of emitters per plant
9. Number of emitters per circuit
10. Emitter spacing

N. Drip irrigation system Installation
1. Step-by-step procedure for installation
2. Required tools
3. Techniques and methods for construction
4. Assembly and layout

O. Operation and management of drip irrigation
1. Frequency and system operating time
2. Determining water use
3. Depth of irrigation and salinity problems
4. Automatic controller timing

VI. METHODS OF INSTRUCTION:
A. **Lecture** -
B. **Discussion** -
C. **Demonstration** -
D. **Field Trips** -
E. Video, slide and film presentations
F. Resource speakers
G. Handout materials by instructor

VII. TYPICAL ASSIGNMENTS:
A. Weekly reading assignments in textbook B. Field trips to specified locations C. Calculate various hydraulic problems D. Plan, design and draw a complete sprinklers irrigation plan for a specified landscape site. E. Plan, design and draw a complete drop irrigation system for a specified landscape site. F. Draw twenty irrigation system details G. Estimate the cost of a specific drip and sprinkler irrigation system

VIII. EVALUATION:
A. **Methods**

B. **Frequency**

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IX. TYPICAL TEXTS:

1. Richard B. Choate *Turf Irrigation Manual.* 5th ed., Weather-matic Division of Telsco Industries, 1994.
2. - *Sprinkler and Drip Irrigation System Design Manuals.*, Rain Bird Irrigation Company, 0.
3. Rain Bird Irrigation Company *Sprinkler and Drip Irrigation Equipment Catalogs.*, Toro Irrigation Company, Buckner Irrigation Company, 0.

X. OTHER MATERIALS REQUIRED OF STUDENTS: