



# El Camino College

## COURSE OUTLINE OF RECORD - Official

### I. GENERAL COURSE INFORMATION

**Subject and Number:** Horticulture 60  
**Descriptive Title:** Basic Landscape Irrigation

**Course Disciplines:** Ornamental Horticulture

**Division:** Natural Sciences

**Catalog Description:** This course introduces the basics of residential and small commercial landscape irrigation and determining the water demand and the water availability of a landscape site. Selection of sprinklers, proper sizing of pipe, and selection of irrigation controllers as well as typical irrigation materials and assembly techniques will be explored. Low volume irrigation systems will also be discussed.

**Conditions of Enrollment:** Recommended Preparation  
Mathematics 12

**Course Length:** ☒ Full Term ☐ Other (Specify number of weeks):  
**Hours Lecture:** 2.00 hours per week ☐ TBA  
**Hours Laboratory:** 3.00 hours per week ☐ TBA  
**Course Units:** 3.00

**Grading Method:** Letter  
**Credit Status:** Associate Degree Credit

**Transfer CSU:** ☒ Effective Date: 1/22/2007  
**Transfer UC:** ☐ No

**General Education:**

**El Camino College:** \_\_\_\_\_

**CSU GE:** \_\_\_\_\_

**IGETC:** \_\_\_\_\_

### II. OUTCOMES AND OBJECTIVES

**A. COURSE STUDENT LEARNING OUTCOMES** (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. The successful Basic Landscape Irrigation student will be able to determine water flow through given pipe based on pipe types and diameters.
2. The successful Basic Landscape Irrigation student will be able to select suitable sprinkler heads and nozzles based on a given landscape area.
3. The successful Basic Landscape Irrigation student will be able to select the proper irrigation pipe types and diameters based on the flow demand to a given area.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <http://www.elcamino.edu/academics/slo/>.

**B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)**

1. Utilize terminology used in landscape irrigation.  
Objective Exams
2. Evaluate prospective landscape irrigation sites.  
Laboratory reports
3. Differentiate landscape plant hydrozones.  
Quizzes
4. Organize hydrozones of a site into irrigation stations.  
Field work
5. Calculate the required number of irrigation heads, appropriate nozzle sizes and head spacing.  
Written homework
6. Compare irrigation valves and controllers.  
Essay exams
7. Perform friction loss calculations.  
Quizzes
8. Demonstrate the ability to safely work with installation equipment.  
Class Performance
9. Demonstrate an understanding of the assembly and installation process.  
Class Performance
10. Compare and contrast various backflow prevention devices.  
Essay exams

**III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)**

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	3	I	Introduction A. Basic hydraulics B. Hydraulic terms C. Basic hydraulic calculations

			D. Using the hydraulic tables in the <i>Rainbird Irrigation Design Manual</i>
Lecture	6	II	Components of a Site Analysis A. Measuring a site B. Site inventory-sketch C. Property lines and boundaries D. Inventory of utilities E. Inventory of plants to be irrigated F. Inventory of areas to avoid irrigating – hard surfaces, vents, doors, windows, etc.
Lecture	6	III	Pipes and Fittings A. Pipe materials – PVC, polyethylene, copper, galvanized steel B. Pipe classification – schedule and class C. Pipe sizes through 2” D. Fitting materials – PVC, polyethylene, copper, galvanized steel E. Fitting nomenclature F. Fitting uses G. Creating a pipe-sizing table for PVC pipe
Lecture	3	IV	The Friction Loss Check Sheet A. Using the friction loss check sheet B. Filling in the friction loss check sheet C. Friction loss calculations
Lecture	6	V	Irrigation Heads and Nozzles A. Types of irrigation heads B. Types of nozzles C. Precipitation rates D. Using catalog tables
Lecture	3	VI	Irrigation Valves A. Types of irrigation valves B. Types of irrigation controllers C. Using catalog tables
Lecture	3	VII	Back Flow Devices A. Protection of potable water supply B. Cross-connections C. Types and uses of different backflow devices D. Using catalog tables
Lecture	3	VIII	Hydrozones A. Water requirements for various plant types B. Organization of plant types into like hydrozones
Lecture	3	IX	Controllers and Wiring A. Controller selection B. Wire sizing and installation
Lab	4	X	Irrigation Hand Tools and Equipment A. Hand tools and hand tool safety B. Tape measures – 25’ and 100’, rolling, walk-behind measuring devices C. PVC pipe primers and glues, Teflon tape, pipe dope
Lab	3	XI	Irrigation Long-handled Tools Usage and Safety A. Long-handle hand tools – shovels, rakes, picks, mattocks, etc.
Lab	3	XII	Irrigation Power Tools and Safety A. Power trenchers and safety B. Power tampers and safety

Lab	3	XIII	Pipes and Fittings Selection A. Pipe and pipe fittings – PVC, polyethylene, copper, galvanized steel
Lab	3	XIV	Galvanized Steel Pipe A. Cutting and threading galvanized steel pipe
Lab	3	XV	Copper Pipe A. Cutting, sanding, fluxing and sweating (soldering) copper pipe
Lab	3	XVI	Polyethylene Pipe A. Cutting, barbed fittings, use of hose clamps
Lab	3	XVII	PVC Pipe A. Cutting, deburring, priming and gluing PVC pipe
Lab	3	XVIII	Irrigation System Installation - Trenching A. Trenching and cross-trenching B. Hand-digging vs. power-trenching C. Manifold pit placement
Lab	6	XIX	Pipe and Fittings Assembly and Installation Techniques A. Determining and cutting pipe lengths B. Pipe layout and layering in trenches
Lab	6	XX	Manifold assembly and installation A. Point of connection B. Isolation valves C. Manifold construction D. Protection of manifold assemblies
Lab	6	XXI	Valves and Backflow Devices A. Valve assembly B. Wiring valves
Lab	4	XXII	Irrigation and Isolation Valve Boxes A. Location of valve boxes B. Depth of valve boxes C. Providing drainage for valve boxes
Lab	4	XXIII	Irrigation Controllers A. Locating controllers B. Installation of controllers F. Wiring controllers
<b>Total Lecture Hours</b>		36	
<b>Total Laboratory Hours</b>		54	
<b>Total Hours</b>		90	

#### IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

##### A. PRIMARY METHOD OF EVALUATION:

Problem solving demonstrations (computational or non-computational)

##### B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

Using an irrigation catalog, technical data information and a scale landscape drawing, select an appropriate irrigation head type and nozzles for the given area

on the drawing. Select appropriate pipe classes, schedules, and pipe sizes.

Create an irrigation design layout displaying proper head and row spacing on the paper provided. Label all materials.

#### **C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:**

1. Use the given irrigation design including pipe types and sizes and valve types and sizes to perform friction loss calculations for the system. Determine whether or not the system can function properly. Show all calculations and provide your explanation in a paragraph.
2. Using a given site plan, select suitable irrigation heads, nozzles, pipes and valves. Determine the best layout and appropriate spacing for the heads. Layout pipe to minimize the amount of trenching required to install the system. Draw a diagram of the layout and explain your selections in a paragraph.

#### **D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Objective Exams

Quizzes

Field work

Class Performance

Homework Problems

Multiple Choice

Matching Items

True/False

#### **V. INSTRUCTIONAL METHODS**

Field trips

Guest Speakers

Lecture

Multimedia presentations

Other (please specify)

Field work installing irrigation systems

**Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.**

#### **VI. WORK OUTSIDE OF CLASS**

Study

Answer questions  
Problem solving activities

**Estimated Independent Study Hours per Week: 4**

## **VII. TEXTS AND MATERIALS**

### **A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS**

Toro. Toro Product Catalog. Toro website, 2015.  
Rainbird. Rainbird Landscape Irrigation Design Manual. Rainbird website, 2000.  
Qualifier Text: Discipline standard,  
Rainbird. Rainbird Product Catalog. Rainbird website, 2015.

### **B. ALTERNATIVE TEXTBOOKS**

### **C. REQUIRED SUPPLEMENTARY READINGS**

### **D. OTHER REQUIRED MATERIALS**

Architect scale  
12" wide roll tracing paper  
Calculator  
Low-tack drafting tape  
Compass  
Circle template  
Work gloves

## **VIII. CONDITIONS OF ENROLLMENT**

### **A. Requisites (Course and Non-Course Prerequisites and Corequisites)**

<b>Requisites</b>	<b>Category and Justification</b>
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### **B. Requisite Skills**

<b>Requisite Skills</b>
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### **C. Recommended Preparations (Course and Non-Course)**

<b>Recommended Preparation</b>	<b>Category and Justification</b>
Non-Course Recommended Preparation  Mathematics 12	Students are required to make measurements and calculations for materials used in irrigation design and layout. A student possessing numerical skills involving fractions, whole numbers, estimations and simple mathematical calculations will have an improved chance of success in the course.

### **D. Recommended Skills**

<b>Recommended Skills</b>
Students are required to possessing numerical skills involving fractions, whole numbers, estimations and simple mathematical calculations to complete course assignments. MATH 12 - Use the order of operations to add, subtract, multiply and exponentiate whole numbers, fractions and decimals. MATH 12 - Use rounding techniques to estimate results of operations on whole numbers, fractions and decimals. MATH 12 - Convert rational numbers into decimals, fractions and percentages.

### **E. Enrollment Limitations**

Enrollment Limitations and Category	Enrollment Limitations Impact
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**Course created by Ronald LaFond on 10/01/2006.**

**BOARD APPROVAL DATE: 01/22/2007**

**LAST BOARD APPROVAL DATE: 08/17/2015**

**Last Reviewed and/or Revised by James Healy on 01/20/2015**

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