

Course Outline

COURSE: WTRM 103 **DIVISION:** 50 **ALSO LISTED AS:**

TERM EFFECTIVE: Fall 2018 **Inactive Course**

SHORT TITLE: ELECTRICAL AND INSTRUMENTATION

LONG TITLE: Introduction to Electrical and Instrumentation Processes

| Units | Number of Weeks | | Contact Hours/Week | | Total Contact Hours |
|-------|-----------------|----------|--------------------|----------|---------------------|
| 3 | 18 | Lecture: | 3 | Lecture: | 54 |
| | | Lab: | 0 | Lab: | 0 |
| | | Other: | 0 | Other: | 0 |
| | | Total: | 3 | Total: | 54 |

COURSE DESCRIPTION:

Introduction to basic electrical theory, applications, common uses and real world examples of control systems and instrumentation used in water distribution, water, and wastewater treatment plants including switches, relays, alarms, motors, instrumentation, valve actuators, computers and communications. This course is now listed as WTRM 203. **ADVISORY:** WTRM 101 Introduction to Water-Wastewater Technology; WTRM 102 Beginning Water-Wastewater Mathematics.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

STUDENT LEARNING OUTCOMES:

1. Explain basic electrical theory and components, such as resistors, capacitors and inductors.
 Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

2. Outline the basic components of AC electricity.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

3. Explain the concept of pressure as it relates to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

4. Describe the concept of level as it relates to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

5. Explain the concept of flow as it relates to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

6. Outline the concepts of temperature and heat as they relates to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

7. Explain the concept of actuators and controllers as they relate to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6

Year assessed, or planned year of assessment: Spring, 2017

8. Explain the concepts of process control, calibration practices, including PID, zero, and span, as it relates to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,3,2,6,5

Year assessed, or planned year of assessment: Spring, 2017

9. Describe the roles of programmable logic controllers as they relate to electrical and instrumentation processes in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,2,3,6

Year assessed, or planned year of assessment: Spring, 2017

10. Describe the role of Supervisory Systems and Data Acquisition (SCADA) in the water industry.

Measure: Exams, Homework

PLO:

ILO: 7,2,3,6

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Inactive Course: 11/13/2017

12 Hours

Content: Basic Electrical Theory and Components - resistors, capacitors, and inductors.

Student Performance Objectives (SPO): Demonstrate basic skills with VOM meters, OHM's law, etc. to gain an understanding of circuit analysis and DC electricity including series circuits parallel circuits, and passive devices . (capacitors, inductors, and resistors)

Out-of-Class Assignments: Read Chapter 2 Dunn Book. Complete homework assignments for DC electrical theory.

9 Hours

Content: AC Electricity

Student Performance Objectives (SPO): Describe AC theory and evaluate AC electrical impact on passive devices and active devices.

Out-of-Class Assignments: Read Chapter 3 of Dunn Book. Complete homework assignments for AC theory. mid-term exam.

3 Hours

Content: Pressure theory

Student Performance Objectives (SPO): Describe the importance of pressure instrumentation and theory as it applies to a water/wastewater utility.

Out-of-Class Assignments: Read Chapter 5 of Dunn Book.

3 Hours

Content: Level theory

Student Performance Objectives (SPO): Demonstrate an understanding of level instrumentation and theory as it applies to a water/wastewater utility.

Out-of-Class Assignments: Read Chapter 6 of Dunn Book.

3 Hours

Content: Flow theory

Student Performance Objectives (SPO): Describe the importance of flow instrumentation and theory as it applies to a water/wastewater utility.

Out-of-Class Assignments: Read Chapter 7 of Dunn Book.

3 Hours

1/25/2018

Content: Temperature and heat, PH and viscosity

Student Performance Objectives (SPO): Demonstrate an understanding of temperature, and PH instrumentation and theory as it applies to a water/wastewater utility.

Out-of-Class Assignments: Read Chapter 8,9 of Dunn Book.

3 Hours

Content: Actuators and controllers

Student Performance Objectives (SPO): Describe the type of devices and controllers commonly used in a water/wastewater environment.

Out-of-Class Assignments: Read Chapter 3 of Dunn Book.

3 Hours

Content: Process control, calibration practices, including PID , zero and span

Student Performance Objectives (SPO): Describe the calibration process for instruments and actuators used to control water flow and distribution.

Out-of-Class Assignments: Read Chapter 14 of Dunn Book.

6 Hours

Content: Introduction to programmable logic controllers

Student Performance Objectives (SPO): Demonstrate proficiency with PLC programming techniques

Out-of-Class Assignments: Read Chapter 1, 2, 3 of Bolton Book

3 Hours

Content: Supervisory Systems and Data Acquisition (SCADA)

Student Performance Objectives (SPO): Describe the use of SCADA systems and applications in the water/wastewater utilities.

Out-of-Class Assignments: Read Chapter 4 of Bolton Book

2 Hours

Final

METHODS OF INSTRUCTION:

Lecture, exams, quizzes, homework assignments, videos

METHODS OF EVALUATION:

CATEGORY 1 - The types of writing assignments required:

Percent range of total grade: 0 % to 0 %

If this is a degree applicable course, but substantial writing assignments are NOT appropriate, indicate reason:

Course primarily involves skill demonstration or problem solving

CATEGORY 2 - The problem-solving assignments required:

Percent range of total grade: 30 % to 50 %

Homework Problems

Quizzes

Exams

CATEGORY 3 - The types of skill demonstrations required:

Percent range of total grade: 10 % to 20 %

Class Performance/s

CATEGORY 4 - The types of objective examinations used in the course:

Percent range of total grade: 40 % to 60 %

Other: multiple choice math - show work

CATEGORY 5 - Any other methods of evaluation:

Percent range of total grade: % to %

REPRESENTATIVE TEXTBOOKS:

Required Representative Textbooks

William Dunn. Fundamentals of Industrial Instrumentation and Process Control, or other appropriate college level text.. McGraw-Hill Books,2016.

Reading Level of Text, Grade: 11th Verified by: Dana Young

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 201230

UC TRANSFER:

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department: WTRM

CSU Crosswalk Course Number: 103

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: C

Maximum Hours: 3

Minimum Hours: 3

Course Control Number: CCC000528476

Sports/Physical Education Course: N
Taxonomy of Program: 095800