

Course Outline

COURSE: WTRM 204 DIVISION: 50 ALSO LISTED AS: WTRM 104

TERM EFFECTIVE: Fall 2019 **CURRICULUM APPROVAL DATE:** 11/13/2018

SHORT TITLE: MOTORS AND PUMPS/O AND M

LONG TITLE: Motors and Pumps, Operation and Maintenance

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:

Theory of pumps and motors, identification of problems encountered, causes of problems, corrective solutions and repair procedures. Implementation of maintenance programs including scheduling and record keeping. This course was previously listed as WTRM 104. **ADVISORY:** WTRM 201 Introduction to Water-Wastewater Technology and WTRM 202 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

05 - Hybrid

72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

1. State the theory of pumps and motors and their application as they relate to water and wastewater.
 Measure of assessment: Homework, Exam

Year assessed, or planned year of assessment: 2018

Semester: Spring

2. Identify the problems, the causes of the problems, and the corrective actions for those problems related to pumps and motors.

Measure of assessment: Exam, Homework

Year assessed, or planned year of assessment: 2018

Semester: Spring

3. Outline the key principles of basic hydraulics.

Measure of assessment: Exam, Homework

Year assessed, or planned year of assessment: 2018

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

Curriculum Approval Date: 11/13/2018

6 Hours

Content: Basic fluid principles.

Student Performance Objectives: Describe fluid principles as related to pump operations theory.

6 Hours

Content: Principles of basic hydraulics.

Student Performance Objectives: Outline the parameters of water hydraulic theory as applied to pump operation in the water utility environment.

3 Hours

Content: Principles, construction, installation, operation, troubleshooting and maintenance of Centrifugal pumps.

Student Performance Objectives: Describe the construction, operation, specification and repair of several types of centrifugal pumps. State the key parameters and issues associated with centrifugal pumps.

3 Hours

Content: Principles, construction, installation, operation, troubleshooting and maintenance of Rotary pumps.

Student Performance Objectives: Describe the construction, operation, specification and repair of several types of rotary pumps. State the key parameters and issues associated with rotary pumps.

3 Hours

Content: Principles, construction, installation, operation, troubleshooting and maintenance of Reciprocating and Displacement pumps.

Student Performance Objectives: Describe the construction, operation, specification and repair of several types of reciprocating and displacement pumps. Explain the key elements and operational issues associated with reciprocation and displacement.

6 Hours

Content: Mid-Term exam. Principles, construction, installation, operation, troubleshooting and maintenance of Special Service pumps.

Student Performance Objectives: Describe the construction, operation, specification and repair of several types of special service pumps. Outline the key operational issues for special service pumps.

2 Hours

Content: Pump Curves, including horsepower and energy mathematics.

Student Performance Objectives: Interpret and select pump curves associated with different pump applications. Describe and explain pump curves, including horsepower and energy mathematics.

1 Hour

Content: Cavitation and net positive suction pressure.

Student Performance Objectives: Describe the causes of cavitation and how to troubleshoot such issues. Explain the concepts of cavitation and positive suction pressure.

9 Hours

Content: Basic components of AC Motors.

Student Performance Objectives: Describe AC motor application as it applies to the water industry. Outline the basic components of AC motors.

9 Hours

Content: Motor control concepts.

Student Performance Objectives: Select and design simple control circuits to control the distribution of water. Outline the concept of motor controls.

2 Hours

METHODS OF INSTRUCTION:

Lecture, discussion, videos.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 36

Assignment Description: Read textbook chapters and related handouts. Study for quizzes and exams.

Required Outside Hours: 36

Assignment Description: Answer study guide questions for each topic presented.

Required Outside Hours: 36

Assignment Description: Homework: Problem solving assignments such as: Select and design simple control circuits to control the distribution of water. and Math problems with show work.

METHODS OF EVALUATION:

Writing assignments

Percent of total grade: 25.00 %

Percent range of total grade: 10% - 30% Study guide questions related to lecture/chapter topics.

Problem-solving assignments

Percent of total grade: 25.00 %

Percent range of total grade: 25% to 50% Homework Problems, Quizzes

Objective examinations

Percent of total grade: 50.00 %

Percent range of total grade: 50% to 75% Multiple Choice, Other: Math - show work

REPRESENTATIVE TEXTBOOKS:

Required Representative Textbooks

Recommended Representative Textbooks

Rex Miller and Mark R. Miller. Industrial Electricity and Motor Controls, Second Edition, or other appropriate college level text. . McGraw-Hill Publishing, 2013.

NOTE: This text is a standard text in the water industry.

ISBN: 9780071818698

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

Required Other Texts and Materials

Rex Miller and Mark R. Miller, Audel Pumps and Hydraulics, 6th Edition, Wiley Publishing, ISBN: 0764571168. This text is a standard text in the water industry.

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Not Transferable

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:

CSU Crosswalk Course Number:

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: CCC000588726

Sports/Physical Education Course: N

Taxonomy of Program: 095800