

Course Outline

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

TERM EFFECTIVE: Fall 2018 **Inactive Course**

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 is now listed as WTRM 204. **ADVISORY:** WTRM 101 Introduction to Water-Wastewater Technology; and 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. Describe basic fluid principles as it relates to pumps.

Measure: Exams, Homework assignments, Quiz

PLO: ILO: 7.3.2

Year assessed, or planned year of assessment: Spring 2017

2. Outline the key principles of basic hydraulics.

Measure: Exams, Homework assignments, Quiz

PLO: ILO: 7,3,2

Year assessed, or planned year of assessment: Spring 2017

3. State the key parameters and issues associated with centrifugal pumps.

Measure: Quiz, Exam

PLO: ILO: 7,3,2,5

Year assessed, or planned year of assessment: Spring 2017

4. State the key parameters and issues associated with rotary pumps.

Measure: Quiz, Exam

PLO: ILO: 7,3,2,5

Year assessed, or planned year of assessment: Spring 2017

5. Explain the key elements and operational issues associated with reciprocation and displacement.

Measure: Quiz, Exam

PLO: ILO: 7,3,2,5

Year assessed, or planned year of assessment: Spring 2017

6. Outline the key operational issues for special service pumps.

Measure: Quiz, Exam

PLO: ILO: 7,3,2,5

Year assessed, or planned year of assessment: Spring 2017

7. Describe and explain pump curves, including horsepower and energy mathematics.

Measure: Exams, Homework assignments, Quiz

PLO: ILO: 7,3,2

Year assessed, or planned year of assessment: Spring 2017

8. Explain the concepts of cavitation and positive suction pressure.

Measure: Quiz, Exam

PLO: ILO: 7,3,2

Year assessed, or planned year of assessment: Spring 2017

9. Outline the basic components of AC motors.

Measure: Quiz, Exam

PLO: ILO: 7,3,2

Year assessed, or planned year of assessment: Spring 2017

10. Outline the concept of motor controls.

Measure: Homework assignments

Quiz, Exam

PLO: ILO: 7,3,2

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

Inactive Course: 11/13/2017

6 Hours

Content: Basic fluid principles.

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

Out-of-Class Assignments: Read Chapter 1 of Millers Book , Answer Study guide questions

6 Hours

Content: Principles of basic hydraulics

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

Out-of-Class Assignments: Read Chapter 2 of Millers Book, Answer Study guide questions

3 Hours

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

Student Performance Objectives (SPO): Describe the construction, operation, specification and repair of several types of centrifugal pumps.

Out-of-Class Assignments: Read Chapter 3 of Millers Book, Answer Study guide questions

3 Hours

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

Student Performance Objectives (SPO): Describe the construction, operation, specification and repair of several types of rotary pumps.

Out-of-Class Assignments: Read Chapter 4 of Millers Book, , Answer Study guide questions

3 Hours

Content: Principles, construction, installation, Operation, troubleshooting and maintenance of Reciprocating and displacement pumps.

Student Performance Objectives (SPO): Describe the construction, operation, specification and repair of several types of reciprocating and displacement pumps.

Out-of-Class Assignments: Read Chapter 5 of Millers Book, Answer Study guide questions

6 Hours

Content: Principles, construction, installation, Operation, troubleshooting and maintenance of Special Service Pumps.

Student Performance Objectives (SPO): Describe the construction, operation, specification and repair of several types of special service pumps.

Out-of-Class Assignments: Read Chapter 6 of Millers Book, , Answer Study guide questions Mid-Term exam

2 Hours

Content: Pump Curves including horsepower and energy mathematics

Student Performance Objectives (SPO): Interpret and select pump curves associated with different pump applications.

Out-of-Class Assignments: Handout to be given in conjunction with this class.

1 Hours

Content: Cavitation and net positive suction pressure.

Student Performance Objectives (SPO): Describe the causes of cavitation and how to troubleshoot such issues.

Out-of-Class Assignments: Handout w. quiz

9 Hours

Content: Basic components of AC Motors.

Student Performance Objectives (SPO): Describe AC motor application as it applies to the water industry.

Out-of-Class Assignments: Read Chapter 3, Chapter 8 of Miller Motor Control book

9 Hours

Content: Motor control concepts.

Student Performance Objectives (SPO): Select and design simple control circuits to control the distribution of water. Out-of-Class Assignments: Read Chapter 16 of Miller Motor Control book . Do a Design problem.

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: 25 % to 50 %

Homework Problems

Quizzes

CATEGORY 3 - The types of skill demonstrations required:

Percent range of total grade: 0 % to 0 %

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

Percent range of total grade: 50 % to 75 %

Multiple Choice

Other: Math - show work

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:

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: 104

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: CCC000528474

Sports/Physical Education Course: N

Taxonomy of Program: 095800