

Course Outline

COURSE: WTRM 121 **DIVISION:** 50 **ALSO LISTED AS:**

TERM EFFECTIVE: Spring 2018 **Inactive Course**

SHORT TITLE: MECHANICAL MAINTENANCE

LONG TITLE: Mechanical 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:

This course is designed to familiarize students with the basic principles of mechanical equipment design, installation, operation, maintenance, repair, overhaul and replacement. The course emphasizes understanding the value of preventative maintenance techniques such as equipment monitoring, lubrication analysis, machine alignment and scheduled overhaul. This course is now listed as WTRM 221. **ADVISORY:** WTRM 101: Introduction to Water/Wastewater Technology.

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 the maintenance skills associated with: Equipment lockout/tagout.

Measure: Reading Assignments,

Quiz,

PLO:

ILO: 3,7,6,2

2. Discuss the maintenance skills associated with: Lubrication and Bearings.

Measure: Reading Assignments,

Quiz,

PLO:

ILO: 3,7,6,2

3. Describe the maintenance skills associated with: Couplings and alignment.

Measure: Reading Assignments,

Quiz,

PLO:

ILO: 3,7,6,2

4. Explain the maintenance skills associated with: Pumps, Valves, and pipelines.

Measure: Reading Assignments,

Quiz,

PLO:

ILO: 3,7,6,2

5. Discuss the need for a preventive maintenance history.

Measure: Reading Assignments,

Quiz, Design project

PLO:

ILO: 7,2,3,6,1

6. Outline the basic parameters of a preventive maintenance system.

Measure: Reading Assignments,

Quiz, Design project

PLO:

ILO: 7,2,3,6,1

7. Explain the CMMS approach to preventive maintenance.

Measure: Reading Assignments,

Quiz, Design project

PLO:

ILO: 7,2,3,6,1

8. Describe the reliability approach to maintenance.

Measure: Reading Assignments,

Quiz, Design project

PLO:

ILO: 7,2,3,6,1

9. Outline the basic parameters of predictive mechanical maintenance.

Measure: Reading Assignments,

Quiz, Design project, Final Exam

PLO:

ILO: 7,2,3,6,1

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

Inactive Course: 03/13/2017

3 Hours

Content: Introduction to Maintenance

Student Performance Objectives (SPO): To give the student an overview of maintenance, including cleaning, equipment inspection, parts replacement etc.

Out-of-Class Assignments: Read Chapter 1 of Tillman book.

3 Hours

Content: Maintenance Skills - Equipment lockout/tagout

Student Performance Objectives (SPO): To emphasize the importance of lockout/tagout as a first step toward any maintenance activity and educate the student on procedures and techniques used for proper lockout/tag out. This will include mechanical lockouts, blocking, electrical lockouts, and other precautionary measures.

Out-of-Class Assignments: Read Chapter 2,3 of Tillman book.

3 Hours

Content: Maintenance Skills - Lubrication and Bearings

Student Performance Objectives (SPO): The student will learn bearing technology, lubrication techniques, bearing failure causes, and bearing replacement techniques for different types of equipment.

Out-of-Class Assignments: Read Chapter 4,5 of Tillman book.

3 Hours

Content: Maintenance Skills - Couplings and alignment

Student Performance Objectives (SPO): The student will gain knowledge on shaft alignment, coupling characteristics, floating couplings, rigid couplings, belt drives, and sheaves. The student will also understand potential costs of not doing this type of mechanical maintenance.

Out-of-Class Assignments: Read Chapter 6,7,8 of Tillman book.

9 Hours

Content: Maintenance Skills -Pumps, Valves, and pipelines

Student Performance Objectives (SPO): The student will become familiar with the makeup and maintenance requirements of centrifugal pumps, displacement pumps, reciprocating pumps and special service pumps. The student will also learn about different types of valves in a water system and identify repair and maintenance techniques for these valves. The student will also understand the basic concepts of leak repair and different techniques to repair and maintain pipe.

Out-of-Class Assignments: Read Chapter 9 of Tillman book.

3 Hours

Content: Manage and Plan - History of Preventive maintenance

Student Performance Objectives (SPO): The student will gain insight into the reasons for preventive maintenance and the importance of a good comprehensive maintenance program.

Out-of-Class Assignments: Read Chapter 2 of Levitt Book

6 Hours

Content: Manage and Plan -PM basics

Student Performance Objectives (SPO): The student will learn basic preventive maintenance concepts including maintenance planning, man-hour investment, associated costs vs. benefit of doing maintenance, and other reliability issues.

Out-of-Class Assignments: Read Chapter 5 of Levitt Book

12 Hours

Content: Manage and Plan -CMMS Approach to PM

Student Performance Objectives (SPO): Modern Water utilities utilize a computerized maintenance management system to administer work effectively. The student will gain skill in the makeup, design, and operation of a CMMS system.

Out-of-Class Assignments: Read Chapter 6 of Levitt Book - Start maintenance plan design project.

6 Hours

Content: Manage and Plan - Reliability approach to Maintenance

Student Performance Objectives (SPO): The student will gain a better understanding of keeping a system reliable with limited resources, and how to integrate these challenges into an effective maintenance plan.

Out-of-Class Assignments: Read Chapter 8 of Levitt Book

3 Hours

Content: Manage and Plan -Predictive mechanical maintenance

Student Performance Objectives (SPO): The student will learn techniques that will specifically address predictive maintenances that can be done periodically to mechanical equipment in a water system, water treatment plant, and waste/water treatment plant as part of an overall maintenance program.

Out-of-Class Assignments: Read Chapter 10,11,12 of Levitt Book

2 Hours

METHODS OF INSTRUCTION:

Lecture, Videos, Reading Assignments, Quizzes and Exams

METHODS OF EVALUATION:

CATEGORY 1 - The types of writing assignments required:

Percent range of total grade: 0 % to %

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

Course is primarily computational

Course primarily involves skill demonstration or problem solving

CATEGORY 2 - The problem-solving assignments required:

Percent range of total grade: 20 % to 30 %

Quizzes

Other: Design project for PM program

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 70 %

Multiple Choice
True/False
Matching Items

REPRESENTATIVE TEXTBOOKS:

Required:

Glenn M. Tillman, Basic Mechanical Procedures at Water And Wastewater Plants, CRC Publishing, 1991, or other appropriate college level text. This is an industry standard text.

ISBN: 978-0873714296

Reading level of text, Grade: 11 Verified by: Dana Young

Other textbooks or materials to be purchased by the student:

Joel Levitt, Complete Guide to Predictive and Preventive Maintenance, Industrial Press Inc. N.Y.

ISBN:0-8311-3154-3

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 201270

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: 121

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: CCC000530898

Sports/Physical Education Course: N

Taxonomy of Program: 095800