

WESTERN IOWA TECH COMMUNITY COLLEGE

Course Syllabus

Mechanical Technician Level 1

Course Title: Mechanical Technician – Level 1

Total Hours: 48

Meeting time/ location :TBA

Instructor: Chris Sewalson

Phone: 712.274.8733 Ext. 1407

E-mail: Chris.sewalson@witcc.edu

Office Location: Le Mars Center

COURSE DESCRIPTION AND PREREQUISITES/COREQUISITES:

The Mechanical Maintenance Certificate combines the disciplines of Hydraulics, Power Transmission, and Pumps. Each of the levels contains portions of each of these disciplines to present a holistic and competency driven approach to the mastering of the skills necessary for a Mechanical Maintenance Technician. Each level is designed to be delivered in such a way that the student attends the levels in a sequential order to ensure a complete understanding of the material. This training can be transcribed into college credit. Test outs are available to ensure the students are prepared for each level prior to registering for the training.

COURSE OBJECTIVES

The course will provide information which should enable the student to:

1. Define hydraulics and give an application
2. Describe the functions of five basic components of a hydraulic system
3. Define hydraulic pressure and give its units of measurement
4. Describe the operation of a hydraulic power unit
5. Describe the function of a hydraulic schematic
6. Describe the function of a hydraulic quick disconnect fitting and give its schematic symbol
7. Describe the function of a tee and give its schematic symbol
8. Describe the operation of a pressure gage and give its schematic symbol
9. Describe the function of a hydraulic cylinder and give an application
10. Describe the operation of a double-acting hydraulic cylinder and give its schematic symbol
11. Describe the function of a 3-position, 4-way DCV and give an application
12. Describe the operation of a 3-position, 4-way DCV and give its schematic symbol
13. Define flow rate and explain how it can be measured
14. Describe the operation of two types of flow meters and give their schematic symbols
15. Describe the operation of a fixed-displacement pump and give its schematic symbol
16. Describe the operation of three types of fixed displacement pumps and give an application of each
17. Describe the main function of a needle valve
18. Describe the operation of a needle valve and give its schematic symbol
19. Describe the function of a hydraulic motor and give an application
20. Describe the operation of a hydraulic motor and give its schematic symbol
21. List three types of hydraulic motors and give an application of each
22. Describe eight basic rules for drawing hydraulic schematics
23. Describe the function of a mechanical power transmission system and give an advantage
24. Describe five methods of rotary mechanical power transmission and give an application of each
25. Describe six rules of safe dress for working with power transmission equipment
26. Describe eight mechanical transmission safety rules
27. Describe the operation of the lockout/tagout system
28. Describe the function of a foundation and give three types
29. Describe the function and construction of a bedplate
30. Describe the function of a spirit level and give an application
31. Describe the operation of a spirit level
32. Describe three types of motor mounts and give an application of each

33. Describe how fasteners are used to attach a motor mount to a bedplate
34. Describe how to select fastener size and type for a motor mount
35. Describe how to mount and level an electric motor
36. Describe two methods of measuring motor shaft speed and give an application
37. Describe the function of a bushing and list three types
38. Describe the construction and operation of a QD bushing and give an advantage
39. Describe the construction and operation of a Conventional V-Belt Drive
40. Describe the construction and operation of a multiple belt v-belt drive
41. Describe the construction and operation of a split taper bushing and give an advantage
42. Describe the construction and operation of a wedge v-belt drive
43. Describe the construction and operation of a taper lock bushing and give an advantage
44. Describe the construction and operation of a notched v-belt and give an advantage
45. Describe the operation of a variable speed v-belt drive system and give an application
46. Describe how to install and align a variable speed v-belt drive system
47. Describe four v-belt configurations and give an application of each
48. Describe the function of a belt idler pulley and give an application
49. Describe the operation of three types of belt idler pulley configurations
50. Describe the function of a pump and give an application
51. List two categories of pumps and give an example of each
52. Describe two types of dynamic pumps and give an application of each
53. Describe the basic operation of a centrifugal pump
54. Describe the functions of nine basic components of a centrifugal pump system
55. Describe six rules of safe dress for working with pumps
56. Describe eight pump safety rules
57. List three methods of pump motor/shaft connections and give an application of each
58. Describe how to install a centrifugal pump with a foot mount
59. Describe the operation of a centrifugal pump with a mechanical seal
60. Describe the flow vs. pressure characteristics of a centrifugal pump
61. Describe how to perform the initial startup and operation of a centrifugal pump
62. Describe how to start up a centrifugal pump after normal shutdown

CONTENT OUTLINE:

1. INTRODUCTION TO HYDRAULICS
2. POWER UNIT OPERATION
3. CIRCUIT CONNECTIONS
4. BASIC CYLINDER CIRCUITS
5. PUMPS
6. NEEDLE VALVES
7. BASIC MOTOR CIRCUITS
8. HYDRAULIC SCHEMATICS
9. MECHANICAL POWER TRANSMISSION SAFETY
10. MACHINE INSTALLATION
11. MOTOR MOUNTING
12. SHAFT SPEED MEASUREMENT
13. CONVENTIONAL V-BELT DRIVES
14. MULTIPLE V-BELT DRIVES
15. WEDGE V-BELT DRIVES
16. VARIABLE SPEED V-BELT DRIVES
17. V-BELT CONFIGURATIONS
18. INTRODUCTION TO PUMPS
19. PUMP SAFETY AND INSTALLATION
20. PUMP OPERATION

COMPETENCIES:

At the conclusion of the course the student will be able to:

1. Read a hydraulic pressure gage
2. Read the liquid level and temperature in the reservoir
3. Operate a hydraulic power unit
4. Connect and disconnect a hydraulic hose that uses quick connect fittings
5. Use a tee to connect two circuit branches together
6. Connect and operate a double-acting hydraulic cylinder using a 3-position, manually-operated DCV
7. Design a dual cylinder hydraulic circuit
8. Draw a hydraulic schematic from the actual circuit connections on a pictorial
9. Draw a hydraulic circuit given a schematic
10. Design a multiple actuator hydraulic circuit
11. Perform a lockout/tagout
12. Use a spirit level to determine orientation of a surface
13. Select a fastener size and type for a motor mount
14. Mount an electric motor and correct for a soft foot condition
15. Level an electric motor
16. Use a digital tachometer to measure motor speed
17. Install and align a conventional v-belt drive system with a QD bushing
18. Install and align a multiple belt v-belt drive system with a split taper bushing
19. Install and align a wedge v-belt drive system with a taper lock bushing
20. Install and align a notched v-belt drive system
21. Install and align a variable speed v-belt drive system
22. Install and adjust a backside v-belt idler
23. Install and adjust a kiss v-belt idler
24. Install a centrifugal pump with a foot mount
25. Start up and operate a centrifugal pump

EVALUATION/GRADING CRITERIA:

QUIZZES

OBJECTIVE TESTS

HANDS ON ASSESMENTS

FINAL TEST

NOTE: REVIEWS AND QUIZZES WILL NOT BE ACCEPTED LATE AFTER THE INDIVIDUALLY ASSIGNED DATE !!!! REVIEWS OR QUIZZES NOT TURNED IN ON TIME WILL BE GIVEN "0" MISSED PRACTICAL TESTS AND FINAL EXAM CAN BE MADE UP ONLY BY THE APPROVAL OF THE INSTRUCTOR.

ATTENDANCE:

Students are expected to attend all sessions of classes for which they are enrolled. Absences do not excuse the student from meeting the course requirements. The student must take the initiative in making up any missed work. Each instructor will provide policies concerning course attendance.

ACADEMIC HONESTY:

Students are responsible for their own learning and development. They have a responsibility to be an active learner by attending class, completing class and laboratory assignments, and preparing in advance of the scheduled class session. Students are expected to understand and maintain high standards of academic honesty. Examples of academic dishonesty include, but are not limited to, the following:

- Cheating
- Plagiarism
- Fabrication
- Dual Submission
- Facilitating Academic Dishonesty

COMPUTER CONDUCT:

College computer systems are provided by WITCC for use by students, faculty, and staff for the purpose of furthering the educational mission of the College. This includes course work, college-related educational endeavors, and business operations. Each user is expected to follow established computer conduct policies and not to interfere with or disrupt the orderly processes of WITCC resources. Users accept the responsibility for utilizing services in ways that are ethical, that demonstrate academic integrity and respect for others who share this resource. Users must follow all existing federal, state, and local laws as they relate to computer conduct.

AMERICANS WITH DISABILITIES ACT (A):

Persons with documented disabilities may request reasonable accommodations through Disability Services, located in the Admissions & Advising Center, A300, or at (712) 274-8733, Ext. 3216.

DISCRIMINATION:

Western Iowa Tech Community College does not discriminate on the basis of race, creed, color, gender, national origin, religion, age, disability, sexual orientation, gender identity, veteran status or any other protected basis as defined in Iowa or federal law as amended from time to time in its educational programs, activities, admission procedures or employment practices. Individuals who believe they have been discriminated against may file a complaint through the College's Grievance or Complaint Procedures. Complaint or Grievance Forms and Procedures may be obtained from the WITCC Human Resources Department, Dr. Robert H. Kiser Building, Room A242, (712) 274-6400, Ext. 1220.

SAFETY AND SECURITY:

WITCC has produced videos regarding safety features and procedures that can be taken by students, staff and faculty. These videos have been posted on the myWIT homepage under the "Safety" tab and may be viewed at any time. An Emergency Response Guide along with Tornado, Fire and Secure Your Area posters have been placed in each classroom and work space area which list specific precautions that should be taken. If you have any questions or concerns, please call the Safety/Security Supervisor at 712-274-8733, extension 3210. If you have an emergency situation at the Sioux City campus, call 1316 or 911 from any telephone on campus immediately. For the outlying campuses call 911 immediately.

As a comprehensive community college, our mission is to provide quality education and to economically enhance the communities we serve.