

Course No: MEC102

Credits: 3

Date: March 2017

Course Title: Basic Hand Tools

Institution: Rogue Community College

Type of Course: Occupational Preparatory

Length of Course: A minimum of sixty (60) lecture/lab hours per one term.

Prerequisites: CS120 or documented proficiency, MTH20, RD90

Department Assignment: Manufacturing Engineering Technology

Course Description: Introduces learners to the basic knowledge needed for assembly and the proper and safe application of hand tools. Coursework builds knowledge in the many types of bolts, wrenches, and other fittings commonly used in industry and how to properly apply them, including pneumatic fabrication fittings. Focuses on proper techniques for checking connections and testing fittings with an emphasis on safety. Proper tool use helps in many ways, including injury avoidance, fewer product quality issues, and lower tool breakage costs.

Institutional Learning Outcomes (ILO):

Application of Knowledge (AK)	Students will synthesize and use knowledge in familiar and unfamiliar situations to effectively solve problems and complete tasks.
Approach to Learning (AL)	Students will engage in and take responsibility for intentional learning, seek new knowledge and skills to guide their continuous and independent development, and adapt to new situations.
Communication (COM)	Students will engage in quality communication using active listening and reading skills and expressing ideas appropriately in oral, written, and visual work.
Critical Thinking (CT)	Students will think critically and creatively about problems and issues in the classroom or school, home, work, and community settings to create positive, sustainable solutions.
Personal Growth (PG)	Students will balance life and civic responsibilities, believe in themselves, accept and commit to change, self-reflect, and be tolerant and respectful of themselves and others.

Course Outcomes, Assessments, and ILO (Institutional Learning Outcomes) Indicators:

Course Learning Outcomes:	Assessment Methods:	ILO Key Indicators:
1. Apply the basics of threaded fasteners. Identify assembly concepts, bolt types, bolts sizes and bolt grades. Apply the use of fixed and adjustable wrenches.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	AK 5 - <i>Demonstrate the ability to adhere to personal and industry standard safety standards.</i>
2. List eight wrench safety rules. Practice how to tighten a threaded fastener with a fixed wrench. Identify Allen and ratchet wrenches.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	
3. Describe the basic components of a pneumatic system. Describe three types of pipe threads. Describe three types of pneumatic fittings. Describe four types of pneumatic tubing.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	CT 3 - <i>Locate, organize, analyze, and interpret data.</i>
4. Describe the function of the four types of screws and screwdrivers: flathead, Phillips head and nut drivers. Describe the function of pliers and locking devices.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	
5. Apply the usage of clamps, vises, pliers, locking nut devices and rings. Practice the use of mallets and non-threaded fasteners and locking pins.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	
6. Define torque and explain its importance, how it's calculated and the formula to use it. Describe how to safely use portable hand tools.	Completion of written assignments and lab projects. Assignments and projects will be assessed with scoring rubric. Instructor observation.	AK 4 - <i>Use numeracy skills for interpretation, synthesis, and analysis of data</i>

Required/Recommended Text(s):

Mechanical Fabrication Student Reference, 1st Ed. Indiana, Amatrol, Inc. 2014 (Required)

Typical required and recommended equipment and materials: Scientific calculator (Texas Instrument TI-3x series), scratch paper for calculations/notes, pen or mechanical pencil, 3-ring binder (required).

Format: A combination of Web (via Blackboard) and face-to-face hands-on instruction for required labs using Amatrol 950-MPF1 training unit.

TYPICAL COURSE CONTENT:

1. Threaded Fasteners

- a. Assembly Concepts
- b. Bolt Types
- c. Bolt Sizes
- d. Bolt Grades
- e. Washers

2. Wrenches

- a. Installation
- b. Fixed Wrenches
- c. Adjustable Wrenches
- d. Allen Wrenches
- e. Ratchet Wrenches

3. Pneumatic Systems Fabrication

- a. Fluid Circuit Components
- b. Pipe Thread Components
- c. Pneumatic Fittings
- d. Pneumatic Tubing

4. Screwdrivers

- a. Screws
- b. Flathead Screwdrivers
- c. Phillips Head Screwdrivers
- d. Nut Drivers

5. Pliers and Locking Devices

- a. Clamps and Vises
- b. Pliers
- c. Locking Nut Devices
- d. Rings

6. Mallets and Non-Threaded Fasteners

- a. Mallets and Hammers
- b. Key Fasteners
- c. Press Fit Assembly
- d. Pins

7. Torque Wrench

- a. Process Control Concepts
- b. Torque-Controlled Tool Identification
- c. Torque Wrench Application

8. Portable Power Tools

- a. Power Tool Safety
- b. Power Tool Operations
- c. Portable Drill/Drivers