

**NEOSHO COUNTY COMMUNITY COLLEGE
MASTER COURSE SYLLABUS**

COURSE IDENTIFICATION

Course Code/Number: ETEC 111

Course Title: Tools & Machines - Maintenance & Safety

Division: Applied Science (AS) Liberal Arts (LA) Workforce Development (WD)
 Health Care (HC) Lifetime Learning (LL) Nursing Developmental

Credit Hour(s): Three (3)

Effective Date: Fall 2013

Assessment Goal Per Outcome: 70%

COURSE DESCRIPTION

This course deals with the general industrial safety and maintenance and safety of hand tools and power tools used in manufacturing. The course involves the proper use, maintenance, selection, and care of both hand tools and machines used with a variety of material.

MINIMUM REQUIREMENTS/PREREQUISITES AND/OR COREQUISITES

None

TEXTS

The official list of textbooks and materials for this course is found on [myNeosho](http://www.neosho.edu).

<http://www.neosho.edu/ProspectiveStudents/Registration/CourseSyllabi.aspx>

GENERAL EDUCATION OUTCOMES

1. Practice Responsible Citizenship through:

- identifying rights and responsibilities of citizenship,
 - identifying how human values and perceptions affect and are affected by social diversity,
 - identifying and interpreting artistic expression.
2. Live a healthy lifestyle (physical, intellectual, social) through:
 - listing factors associated with a healthy lifestyle and lifetime fitness,
 - identifying the importance of lifetime learning,
 - demonstrating self-discipline, respect for others, and the ability to work collaboratively as a team.
 3. Communicate effectively through:
 - developing effective written communication skills,
 - developing effective oral communication and listening skills.
 4. Think analytically through:
 - utilizing quantitative information in problem solving,
 - utilizing the principles of systematic inquiry,
 - utilizing various information resources including technology for research and data collection.

COURSE OUTCOMES/COMPETENCIES (as Required)

A student who successfully completes the course should be able to:

- I. Describe safety and health principles in the workplace.
 - A. *Discuss safety.*
 1. Define the terms accident and hazard.
 2. Name and define the four main types of hazards.
 3. List and define the various types of accidents.
 4. Compare meanings of the terms unsafe act and unsafe condition.
 5. Name the three ways in which a toxic substance can enter your body.
 6. List ways in which a company must plan for emergencies.
 7. Tell the main reason for prompt accident investigation.
 - B. *Discuss safety laws.*
 1. State the purpose of the OSHA act.
 2. List the specific rights of employees under the Act.
 3. Explain what you do in a dangerous work situation.
 4. List the things you can do to help keep your workplace in compliance with OSHA standards.
 5. Explain the function of each of the following agencies: NIOSH, EPA.
 6. List the four main objectives of OSHA's Hazard Communication Standard.
 7. Tell what information can be found on an MSDS.
 - C. *Discuss personal protective equipment.*
 1. List employer and employee responsibilities related to PPE.
 2. Tell why work clothing can be dangerous if it fits poorly.
 3. Explain the importance of proper glove selection when handling chemicals.
 4. Describe the proper fit of a hard hat.
 5. Compare and contrast everyday eyeglasses, industrial safety glasses, and safety

- goggles.
- 6. Identify the noise level at which you must wear hearing protection.
- 7. Name the two basic kinds of respirators.
- D. *Discuss chemical safety.*
 - 1. Define the terms chemical hazard, physical hazard, and health hazard.
 - 2. Name three kinds of physical hazards.
 - 3. Name and describe at least four kinds of health hazards.
 - 4. Identify common symptoms of chemical exposure.
 - 5. List three health hazard exposure routes.
 - 6. Name three ways of controlling chemical hazards and exposures.
 - 7. Explain first aid procedures to follow when you are exposed to a hazardous chemical.
- E. *Discuss general tool safety.*
 - 1. Name at least three causes of hand tool accidents.
 - 2. List one safety rule to follow when using each of the following: wrench, screwdriver, pliers, hammer, chisel, knife.
 - 3. Describe proper and improper dress for working with rotating power tools.
 - 4. Explain the importance of grounding electric tools.
 - 5. Name two hazards involved in pneumatic tool use and explain how to guard against them.
 - 6. Explain proper handling and storage of gasoline.
- F. *Discuss safe material handling.*
 - 1. List simple safety procedures and precautions related to material handling.
 - 2. Describe how to lift, carry, and put down a load.
 - 3. Explain safety principles for working with or around industrial trucks.
 - 4. Discuss safety rules for working with or around conveyor hoists.
 - 5. Describe how and where to store materials.
- G. *Discuss machine safety.*
 - 1. Identify a machine's point of operation and other pinch points, and explain why they are dangerous.
 - 2. Identify different kinds of mechanical safeguards, and explain why they are necessary.
 - 3. Define zero energy state.
 - 4. Describe the lockout/tagout procedures established by the OSHA energy control standard.
- H. *Discuss electrical safety.*
 - 1. Define the following terms: electric current, circuit, potential difference, ampere, watt, ohm, and volt.
 - 2. State Ohm's Law.
 - 3. Explain the function of each wire in a simple electric circuit and tell the color(s) used to identify each.
 - 4. List the three factors that affect the severity of an electric shock.
 - 5. Describe the effects of electric current on the human body.
 - 6. Tell the three most important points about first aid for shock victims.
 - 7. Explain how static electricity is generated, why its accumulation can be dangerous, and how it can be avoided.

- I. *Discuss electrical protection.*
 1. Explain the importance of proper grounding.
 2. Define the term "ground fault" and explain how ground faults occur.
 3. Explain the purpose and operation of the following devices: GFCI, fuse, circuit breaker.
 4. Identify typical hazardous electrical locations.
 5. Explain the purpose of explosion-proof and intrinsically safe electrical equipment.
 6. List at least two electrical safety rules in each of the following areas: clothing, equipment, water, lockout/tagout.
- J. *Discuss fire protection.*
 1. List and explain the four elements of the fire pyramid.
 2. Name and give the definition of the four classes of fires.
 3. Define the terms flash point and spontaneous combustion.
 4. Name the fire-fighting agents, and explain how they work and when to use them.
 5. Explain the use of at least two different types of portable fire extinguishers.
 6. List three ways of preventing fires.
 7. Explain fire hose and fire extinguisher maintenance.
- K. *Explain health protection.*
 1. Define ergonomics and tell how poor ergonomic conditions affect the body.
 2. List three actions that you can take to protect your hearing.
 3. Tell the cause of each of the following lung diseases: asbestosis, lung cancer, brown lung, black lung, silicosis.
 4. Contrast ionizing and nonionizing radiation.
 5. Compare and contrast personal and background sampling.
 6. Explain the importance of protecting women from exposure to certain chemicals.
 7. State the purpose of the EPA.
- L. *Describe safe work practices.*
 1. Explain the importance of industrial housekeeping.
 2. List safety measures related to walkways, stairs, and floor openings.
 3. Tell how to protect yourself and others when working in traffic paths.
 4. Describe at least three hazards involved with each of the following and tell how to safeguard against them: working at elevations and working in confined spaces.
 5. Calculate the proper placement of a straight ladder based on its working length.
 6. Name two kinds of scaffolds and give at least one safety rule associated with each.
 7. List symptoms of heatstroke, heat cramps, and heat exhaustion.
 8. Name two major safeguards necessary when welding.
 9. Explain how to handle and store cylinders safely.
- II. Describe and demonstrate safe practices with hand tools.
 - A. *Discuss measuring tools.*
 1. Explain how to hold a rigid rule correctly when measuring an object and show from which point the measurement begins.
 2. Describe how to set lock joint transfer-type calipers.
 3. Identify vernier calipers.
 4. Explain how to take a measurement with a micrometer caliper.
 5. Name the parts of a combination square.
 - B. *Discuss wrenches and screwdrivers.*

1. Identify types of materials used for making wrenches.
2. Identify open-end, box-end, socket, socket-head, adjustable, torque, and striking-face wrenches.
3. Describe two sizes that are important in identifying a socket wrench.
4. Identify standard, Phillips, offset, and spiral-ratchet screwdrivers.
5. List the steps to follow when driving a screw.

C. Discuss pipefitting tools.

1. Identify a straight pipe wrench, a Stillson wrench, a chain pipe wrench, a strap wrench, and a compound-leverage wrench.
2. Explain how to use a pipe wrench.
3. Explain why a machinists' vise should not be used for holding pipe.
4. Explain how to thread pipe.
5. Explain how to clean a pipe tool.
6. Explain how to cut and flare tubing.

D. Discuss plumbing tools.

1. Explain how to use a mechanical tube bender.
2. List the steps in joining hubless pipe.
3. Explain why the drain pipe should be completely covered by the force cup.
4. Name the criteria used in selecting line clearing tools.
5. List the steps in measuring pipe when using the center-to-center measuring systems.

E. Discuss electrician's tools.

1. Explain how to use an EMT bender and a neon circuit tester.
2. List the parts of a knockout punch.
3. Name the uses of the all-purpose tool.

F. Discuss woodworking tools.

1. Describe the difference between a rip saw and a crosscut saw.
2. Explain the difference between a compass saw and a keyhole saw.
3. Describe the different types of planes.
4. Identify a Forstner bit.
5. Explain the working of a plumb line.

G. Discuss masonry, plastering, and glazing tools.

1. Explain how to mix a small batch of mortar.
2. List the uses of a trowel.
3. Define tuckpointing.
4. Explain why flat concrete surfaces must be screeded.
5. Explain how to repair one of the following problems: (a) small plaster cracks, (b) shrinkage cracks, or (c) loose or bulging plaster.
6. Explain how to replace a broken pane of glass in a window.

H. Discuss sheet metalworking tools.

1. Identify different types of snips and punches.
2. Identify the bench stakes discussed in this Lesson.
3. List six safety practices to follow when working with sheet metal.
4. Describe different types of sheet metal.
5. Discuss metalworking tools.
6. Select the proper hacksaw blades for cutting various materials.

7. Explain the difference between single-cut and double-cut files.
8. List the types of taps usually found in a tap set.
9. Explain how to cut an external thread on a bolt, screw, or stud.
10. Explain how to remove a reamer from a hole.

I. Discuss hoisting and pulling tools.

1. Explain how to prevent synthetic and fiber rope from unraveling.
2. Explain how individual wires and strands of wire are formed into wire rope.
3. Identify the most appropriate sling for use near corrosive chemicals.
4. Identify a slide-hammer puller.
5. Describe different kinds of slings and loads.

III. Describe and demonstrate safe practices with hand power tools.

A. Discuss electric drills.

1. Name four parts that are common to both the light-duty drill and the heavy-duty drill.
2. Name the parts of a drill bit.
3. Explain how to drill a blind hole.
4. Explain how to inspect a drill bit, both visually and through testing.
5. List the safety rules to follow when using electric power tools.

B. Discuss electric hammers.

1. Explain the difference in hammering action between a percussion hammer and a rotary hammer.
2. Select the proper chisel to use for each of the following jobs: brick cleaning; general demolition work; edging, chipping, and channeling; and removing floor tile.
3. List the precautions that should be taken to ensure electrical safety when using an electric hammer.
4. Name two safety items to use when operating an electric hammer in damp or wet areas.

C. Discuss pneumatic drills and hammers.

1. Explain how drill size is determined.
2. Describe the chiseling action of a bull point chisel when it is used to clean masonry seams.
3. Describe how to use a rivet buster.
4. Explain drill speed requirements.
5. Identify various types of drill bits used in pneumatic hammers.

D. Discuss screwdrivers, nutrunners, and wrenches.

1. Identify the operating advantages of pneumatic tools.
2. Define stalling torque.
3. Describe the clutch action of direct drive, positive drive, and adjustable torque drive.
4. Explain how to install a bit in an electric screwdriver.
5. Describe how to install multiple fasteners correctly in a circular pattern.
6. List safety rules to follow when using power screwdrivers and wrenches.
7. Describe the difference between pneumatic and electric nutrunners.

E. Discuss linear-motion saws.

1. List other names for both the saber saw and the reciprocating saw.

2. Describe the cutting action of a saber saw.
 3. Explain how to draw a saw blade with regular set teeth and one with wavy set teeth.
 4. Explain how to plunge cut a rectangular opening.
 5. List the types of band saw blades and a few characteristics of each.
- F. Discuss circular saws.*
1. Name the major parts of a circular saw.
 2. Describe the cutting action of a circular saw.
 3. List the factors that determine feed speed.
 4. State the definition of an arbor.
 5. Identify different types of blades.
- G. Discuss routers and planes.*
1. Discuss how to use a router.
 2. Name the major parts of a router.
 3. Explain how to use a router and bit.
 4. Identify a rabbeting joint, a straight joint, and a mortising joint.
 5. Explain how to adjust and use a power plane.
- H. Discuss electric sanders.*
1. Explain how to install a sanding belt.
 2. Identify different types of sanding belts.
 3. Explain how to flush the gear chamber of a belt sander.
 4. Discuss the assembly of a sanding disk.
 5. List the safety rules to follow when using a disk sander.
- I. Discuss grinders and sheers.*
1. State the meaning of each symbol in the six-symbol standard marking system for grinding wheels.
 2. Explain the correct procedure for mounting a grinding wheel.
 3. List safety rules to follow when using a grinder.
 4. Discuss how to maintain grinders.
- J. Discuss tool sharpening.*
1. State the reasons for sharpening tools.
 2. Explain the use of whetstones
 3. Identify a bench stone.
 4. Explain how to sharpen taps, dies, screwdrivers, and chisels.

MINIMUM COURSE CONTENT

The following topics must be included in this course. Additional topics may also be included.

- I. Health and Safety
- II. Hand Tools
- III. Power Tools

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

INSTRUCTIONAL METHODS

1. Lecture and discussion will be used in the presentation of concepts, information and assignment requirements.
2. Demonstrations of procedures and techniques.
3. Lab time will be provided for skill development using tools and equipment.
4. Outside assignments will consist of reading and completion of worksheets.
5. Audio-visuals may supplement instruction.

STUDENT REQUIREMENTS

Concepts will be evaluated through the use of workbook, periodic tests, tool identification and practical application.

GRADING SCALE

Grades will be determined according to the following scale:

A = 90% - 100%

B = 80% - 89%

C = 70% - 79%

D = 60% - 69%

F = 0 - 59%

ASSESSMENT OF STUDENT GAIN

The purpose of assessing student learning at Neosho County Community College is to ensure the educational purposes of the institution are met and appropriate changes are made in program development and classroom instruction to allow for student success. The instructor(s) of this course will determine the methods of assessment most appropriate and complete an assessment report at the end of the course.

In addition to pre and post testing, students will be evaluated by observation using safe practices with hand and power tools. Each student will be observed and/or interviewed and initial papers produced will be examined to determine needed competency development throughout the course. Post-assessment to determine gain in competency will be measured at the end of each unit of study.

Attendance Policy

1. NCCC values interactive learning which promotes student engagement in the learning process. To be actively engaged, the student must be present in the learning environment.
2. Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed one-eighth of the total course duration, (which equates to one hundred (100) minutes per credit hour in a face-to-face class) the instructor

has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been dropped. A student may petition the chief academic officer for reinstatement by submitting a letter stating valid reasons for the absences within one week of the registrar's notification. If the student is reinstated into the class, the instructor and the registrar will be notified. Please refer to the Student Handbook/Academic Policies for more information

3. Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

ACADEMIC INTEGRITY

NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

ELECTRONIC DEVICE POLICY

Student cell phones and other personal electronic devices not being used for class activities must not be accessed during class times unless the instructor chooses to waive this policy.

NOTE

Information and statements in this document are subject to change at the discretion of NCCC. Students will be notified of changes and where to find the most current approved documents.

ACCOMMODATIONS

If you are a student with a disability who may need accommodation(s), in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, please notify the Dean of Student Services in the Student Services Office, Sanders Hall, 620-432-0304, on the Chanute Campus, or the Dean for the Ottawa and Online Campuses, 785-248-2798, on the Ottawa Campus as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

NON-DISCRIMINATION POLICY

The following link provides information related to the non-discrimination policy of NCCC, including persons with disabilities. Students are urged to review this policy.

<http://www.neosho.edu/Departments/NonDiscrimination.aspx>

SEXUAL MISCONDUCT POLICY (TITLE IX)

At NCCC, it is the responsibility of an instructor to help create a safe learning environment in the classroom, including both physical and virtual classrooms. All instructors are considered mandatory reporters at NCCC, therefore any information regarding sexual misconduct that is shared by a student in one-on-one meetings with the instructor must be reported to appropriate personnel at the College. Instructors will keep the information private to the greatest extent possible, but it is not confidential. Generally, climate surveys, classroom writing assignments or discussions, human subjects research, or events such as Take Back the Night events do not provide notice that must be reported to the Coordinator by employees, unless the reporting party clearly indicates that they wish a report to be made.

The following link provides information related to the sexual misconduct policy of NCCC, including resources, reporting options, and student rights. Students are urged to review this policy.

<http://www.neosho.edu/TitleIX.aspx>

COURSE NOTES