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MCH 112.01: Related Metals Processes - HEO

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**THE UNIVERSITY OF MONTANA MISSOULA
MISSOULA COLLEGE
INDUSTRIAL TECHNOLOGY DEPARTMENT**

COURSE SYLLABUS

COURSE NUMBER AND TITLE: MCH 112T RELATED METALS PROCESSES

DATE REVISED: Spring 2016

SEMESTER CREDIT: 1

PREREQUISITES: None

INSTRUCTOR: James Mason

E-MAIL: james.mason@mso.umt.edu

OFFICE LOCATION: RPE/Machining/Welding Lab

PHONE: 406-243-7646

OFFICE HOURS: M-W-F 12pm-1pm

RELATIONSHIP TO PROGRAM(S): MCH112 is a basic metalworking course covering fasteners, layout, bench work, metals, welding, heat treating, threading, drills and drilling. There will also be limited discussion and operation of lathes and milling machines.

COURSE DESCRIPTION: Use of hand tools and machines which relate to the repair of heavy equipment. Instruction covers fasteners, layout, bench metal, threads and threading, drills and drilling, and tool sharpening.

STUDENT PERFORMANCE OUTCOMES:

Occupational Performance Objectives

Upon completion of this course, the student will be able to:

1. Identify types of fasteners and their application.
2. Cut internal and external threads using taps and dies.
3. Use precision measuring instruments.
4. Setup and use basic layout tools.
5. Correctly sharpen drills.
6. Understand basic use of lathe and milling machines.
7. Understand basic use of inverter and engine driven welder.

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:

STUDENT EXPECTATIONS:

Students are expected to treat the class as they would a job in their field of study which means:

- Follow all safety rules and classroom or laboratory procedures
- Pay attention, take notes, and read and refer to the textbook
- Bring all required materials daily, or lose a percentage point per occurrence
- Participate in lab clean-up, which begins 10 minutes before the scheduled class end
- Participate in semester end lab clean-up, or lose all of the professionalism grade
- No food or drink, smoke-breaks, cell-phones or other personal multimedia in or during class

Each student will be assigned a role in addition to their normal duties as a student. Roles include but are not limited to:

- Safety Supervisors
- Layout & Tool Crib Cleanup
- Equipment & Materials Cleanup
- Grind Area Cleanup
- Cleanup

PORTFOLIO: Students will organize notes, assignments, tests, quizzes, and projects into a 3-ring binder. (10% of Assignments Grade)

COURSE GRADING SCALE:

A = 90% - 100%
 B = 80% - 89%
 C = 70% - 79%
 D = 60% - 69%
 F = <60%

IMPLIED FEATURE GRADING SCALE:

A $\pm .000$ " - $.005$ " of design specifications*
 B $\pm .0051$ " - $.007$ " of design specifications*
 C $\pm .0071$ " - $.010$ " of design specifications*
 D $\pm .0011$ " - $.015$ " of design specifications*
 F > $.015$ " of design specifications*

NOTE: Courses must be passed with a 'C minus (C-)' or greater to count toward degree/certificate requirements.

The following criteria will be used for grading. Grades will be posted periodically and will be available to students upon request during office hours.

1. Assignments: 25%

- Due Assignments** are to be turned in before 5 minutes after the class is scheduled to begin, otherwise it will be considered Late Work*.
- Late Work** will not be accepted unless absences are excused; and are due the following day. There is a two-week (or Friday before finals week) late submission deadline.
- Corrected Assignments** will be returned the Monday after they are due. If you are absent, acquire corrected assignments during office hours.
- Missed Assignments** will be made available only to students with excused absences, and only during office hours.

2. Tests: 25%

- Quizzes and pop quizzes will not be made up if missed.
- Tests and exams

3. Lab: 40%

- Quality of project workmanship (see Feature Grading Scale)
- Quality of project measurement, processes, and quality control
- Equal workload when working in groups or partnerships (-1% for each occurrence, up to 5%)

4. Professionalism: 5%

- Work ethic (safety, work done on time, care of tools and equipment, etc.)
- Interpersonal skills (cooperation, leadership, participation, attitude, etc.)

5. Attendance: 5%

- 2 absences, arriving late, attending unprepared, or combination thereof will reduce the students' final course grade by one-half grade letter
- See attendance policy and student expectations

ATTENDANCE POLICY:

It is the student's responsibility to utilize class time to acquire and maintain skills in preparation for quizzes, exams, and completion of assignments and projects. Students must attend all safety training days during the first week of instruction. Failure to do so may result in removal from the course.

Notify the instructor of absence(s) before scheduled class time, via phone or email listed above. Absences are considered an "unexcused absence" unless a doctor's note is received. There will be no "make-up" for quizzes, tests, or assignments missed due to unexcused absences. "Excused absences" will receive a matching number of days excusal period as absent starting immediately upon your return. It is the student's responsibility to get caught-up.

REQUIRED TEXTBOOKS: Basic Machining Reference Handbook, Meyers & Slattery

REQUIRED MATERIALS:

- See attached “Required tools and materials for MCH 112 students” handout
- Bring ALL required materials to before class begins, do not retrieve them during class
- Failure to bring required materials results in -1% professionalism (-1% off of your course grade)

ACADEMIC INTEGRITY: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umn.edu/SA/VP/SA/index.cfm/page/1321>.

DISABILITY ACCOMMODATION: Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umn.edu/dss/> or call 406.243.2243 (Voice/Text).

NOTE: Faculty reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.

COURSE OUTLINE:

1. Safety
 - 1.1. Eye, ear, hand, lung, and other body protection
 - 1.2. Proper use of hand and power tools
 - 1.3. Shop and Machine maintenance
2. Machining Mathematics
 - 2.1. Inches
 - 2.2. Fractional to Decimal
 - 2.3. Machining Formulas
 - 2.3.1. RPM, SFM, IPR, IPM
 - 2.4. Geometry & Trigonometry
3. Measuring
 - 3.1. Steel Rules
 - 3.2. Dial Calipers
 - 3.3. Micrometers
 - 3.4. Small hole and telescoping gages
 - 3.5. Dial bore gages and dial indicators
 - 3.6. Co-Ax indicators
 - 3.7. Sin bar calculations
4. Metals and Metal Identification
 - 4.1. Steel Classifications
 - 4.1.1. Ferrous
 - 4.1.1.1. SAE
 - 4.1.1.2. AISI
 - 4.1.2. Non-ferrous
 - 4.1.3. Tool steels
 - 4.2. Heat treating
5. Machine Shop Layout
 - 5.1. Surface preparation
 - 5.2. Layout tools
 - 5.3. Layout procedures
6. Drills and drilling
 - 6.1. Drill bit identification
 - 6.2. Twist drills
 - 6.3. Speeds and feeds
 - 6.4. Drill press operation
 - 6.5. Hold downs and fixtures
7. Fasteners
 - 7.1. Cap screws and Machine Screws
 - 7.2. Cotter and roll pins
 - 7.3. Taper pins
 - 7.4. Press pins

- 7.5. Keys
- 7.6. Liquid locking products
- 8. Threads and Threading
 - 8.1. Bolt strength classification
 - 8.2. Thread size and classification
 - 8.3. Thread terms and definitions
 - 8.4. Hand taps and dies
 - 8.5. Bolt and nut extraction
 - 8.6. Tap extraction
- 9. Engine Lathe Operation
 - 9.1. Introduction and Safety
 - 9.2. Setup and Operation
- 10. Milling Machine Operation
 - 10.1. Introduction and Safety
 - 10.2. Setup and Operation

GENERAL LAB SAFETY RULES

All students must agree to follow this non-inclusive list of safety rules and professional behavior guidelines.

Work Safely:

1. **Never work unsupervised.** All students must notify the instructor before and after working in the lab.
2. **Never work when impaired**, due to inadequate sleep or under the influence of alcohol or other substances.
3. **Never operate machinery without receiving proper instruction** (this includes but is not limited to the proper management of machine setup, speeds, feeds, and depths of cut, for any given process), **or if you are uncomfortable.**
4. **Exercise as many safety precautions as possible**, including wearing safety glasses and other protective clothing and accessories at all times when working in the lab, including demonstrations and cleanup.
5. **Clean spills IMMEDIATELY!**

Know what to do in case of an EMERGENCY:

1. **Know the locations of machine and laboratory emergency shut-off switches and/or power boxes.**
2. **Know the locations, eyewash station, fire extinguishers, fire exits, and first aid kits.**
3. **Report all personal injuries immediately.**
4. **Prevent chemical accidents by familiarizing yourself with the chemical(s) in the MSDS.**

Violations of General Lab Safety Rules:

- **1st offense:** Verbal warning.
- **2nd offense OR any serious infraction:** Student is unable to use the facility for one (1) full day of scheduled lab time immediately following the offense.
- **3rd offense OR any offense creating a dangerous situation:** Student may be subject to termination from the course.

My signature below indicates that I have read and understood the descriptions, policies and procedures stated in the syllabus for MCH112 Related Metal Processes:

Student Name (Print): _____

Student Signature: _____

Date Signed: _____