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MCH 115.01: Related Metals Processes - DET

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

COURSE SYLLABUS

COURSE NUMBER AND TITLE: MCH 115 Related Metals Processes

DATE REVISED: Autumn 2015

SEMESTER CREDIT: 3

PREREQUISITES: None

INSTRUCTOR: Levi Robertson

E-MAIL: levi.robertson@mso.umt.edu

PHONE: 406-243-7646

OFFICE LOCATION: RPE/Machining/Welding Lab

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

COURSE DESCRIPTION: A basic metalworking course covering fasteners, layout, bench metal, heat treating, threads and threading, drills and drilling, basic machining and tool sharpening, and engine related machining.

STUDENT PERFORMANCE OUTCOMES:

Occupational Performance Objectives

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

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. Sharpen drills, and lathe tools
6. Setup and operate band saw, drill press, metal lathe, and milling machine
7. Calculate speeds and feeds for machining
8. Use clamping and other holding devices
9. Diagnose and recognition cylinder heads
10. Diagnose and recognition cylinder blocks and crankshafts

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:

- Shop Manager/Foreman
- Layout & Tool Crib Supervisor
- Equipment & Materials Supervisor
- Cleanup Supervisor
- Cleanup

COURSE GRADING SCALE:

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

IMPLIED FEATURE GRADING SCALE:

A ± .000" - .002" of design specifications*
 B ± .0021" - .004" of design specifications*
 C ± .0041" - .007" of design specifications*
 D ± .0071" - .011" of design specifications*
 F > .011" 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%

- a. **PORTFOLIO:** Students will organize notes, assignments, tests, quizzes, and projects into a 3-ring binder. (10% of Assignments grade)
- b. **Due Assignments** are to be turned in before 5 minutes after the class is scheduled to begin, otherwise it will be considered Late Work*.
- c. **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
- d. **Corrected Assignments** will be returned the Monday after they are corrected. If you are absent, acquire corrected assignments during office hours.
- e. **Missed Assignments** will be made available to students during office hours.

2. Tests: 30%

- a. Tests, quizzes, and pop quizzes will not be made up if missed.
- b. Moodle tests:
 - i. 3 attempts total*
 - ii. >90% Score required to operate machinery
 - iii. Available every Monday at 8:00 AM
 - iv. Due every Friday at 12:00 AM

3. Lab: 40%

- a. Quality of project workmanship (see Feature Grading Scale)
- b. Quality of project measurement, processes, and quality control

4. Professionalism: 5%

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

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 before course work is due.

5 absences, arriving late, attending unprepared, or combination thereof will reduce the students' final course grade by one grade letter.

REQUIRED TEXTBOOKS: Basic Machining Reference Handbook, Meyers & Slattery

REQUIRED MATERIALS: (Failure to bring required materials results in -1% professionalism)

- Safety glasses, protective clothing
- 3-Ring binder with minimum 6 dividers or folders, clear sheet jackets optional
- Calculator with SIN, COS, TAN (cellphones are not allowed during quizzes and tests)
- Permanent marker and miscellaneous tools
- 5/16" chainsaw file
- ¼" or 5/16" HSS lathe toolbit
- 7/16" or ½" HSS end mill (2 or 4 fluted)
- 4" or 6" Digital Caliper (no plastic)

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.umt.edu/SA/VPSA/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.umt.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. Measuring – Chapter 1 (pg 1-15)
 - 2.1. Steel Rules
 - 2.2. Dial Calipers
 - 2.3. Micrometers
 - 2.4. Small hole and telescoping gages
 - 2.5. Dial bore gages and dial indicators
3. Metals and Metal Identification – Chapter 7 (pg 238-266)
 - 3.1. Steel Classifications
 - 3.1.1. Ferrous
 - 3.1.1.1. SAE
 - 3.1.1.2. AISI
 - 3.1.2. Non-ferrous
 - 3.2. Heat treating
4. Machine Shop Layout
 - 4.1. Surface preparation
 - 4.2. Layout tools
 - 4.3. Layout procedures
5. Cutoff – Chapter 2 (pg 16-42)
 - 5.1. Band saws
 - 5.2. Abrasive saws
6. Grinding – Chapter 6 (pg 174-237)
 - 6.1. Abrasive types
7. Engine Lathe Operation – Chapter 3 (pg 43-99)
 - 7.1. Introduction and Safety
 - 7.2. Setup and Operation
8. Milling Machine Operation – Chapter 4 (pg 100-138)
 - 8.1. Introduction and Safety
 - 8.2. Setup and Operation
9. Drills and drilling – Chapter 5 (pg 139-173)

- 9.1. Drill press identification
- 9.2. Drill press processes
- 9.3. Twist drills (pg142-151)
- 9.4. Speeds and feeds
- 9.5. Hold downs and fixtures
- 10. Fasteners
 - 10.1. Cap screws and Machine Screws
 - 10.2. Cotter and roll pins
 - 10.3. Taper pins
 - 10.4. Press pins
 - 10.5. Keys
 - 10.6. Liquid locking products
- 11. Engine Cylinder Head Valvetrain Components
 - 11.1. Valvetrain teardown
 - 11.2. Valve inspection and reconditioning
 - 11.3. Valve guide inspection and reconditioning
 - 11.4. Valve seat inspection and reconditioning
- 12. Engine Cylinder Block Boring and Honing
 - 12.1. TBD

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 MCH115 Related Metal Processes:

Student Name (Print): _____

Student Signature: _____

Date Signed: _____