Spring 1-2016

MCH 115.01: Related Metals Processes - DET

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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:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
<td>A ± .000&quot; - .002&quot; of design specifications*</td>
</tr>
<tr>
<td>B</td>
<td>80% - 89%</td>
<td>B ± .0021&quot; - .004&quot; of design specifications*</td>
</tr>
<tr>
<td>C</td>
<td>70% - 79%</td>
<td>C ± .0041&quot; - .007&quot; of design specifications*</td>
</tr>
<tr>
<td>D</td>
<td>60% - 69%</td>
<td>D ± .0071&quot; - .011&quot; of design specifications*</td>
</tr>
<tr>
<td>F</td>
<td>&lt;60%</td>
<td>F &gt; .011&quot; of design specifications*</td>
</tr>
</tbody>
</table>

**IMPLIED FEATURE GRADING SCALE:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A ± .000&quot; - .002&quot; of design specifications*</td>
</tr>
<tr>
<td>B</td>
<td>B ± .0021&quot; - .004&quot; of design specifications*</td>
</tr>
<tr>
<td>C</td>
<td>C ± .0041&quot; - .007&quot; of design specifications*</td>
</tr>
<tr>
<td>D</td>
<td>D ± .0071&quot; - .011&quot; of design specifications*</td>
</tr>
<tr>
<td>F</td>
<td>F &gt; .011&quot; of design specifications*</td>
</tr>
</tbody>
</table>

**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: ___________________________________________________________