MCH 114.01: Related Metals Processes II

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COURSE NUMBER AND TITLE: MCH 114 Related Metals Processes
DATE REVISED: Autumn 2014
SEMESTER CREDIT: 3
PREREQUISITES: None
INSTRUCTOR: James Mason
E-MAIL: james.mason@umontana.edu
PHONE: 406-243-7646
OFFICE LOCATION: RPE/Machining/Welding Lab
OFFICE HOURS: M,W,F 12pm-1pm

COURSE DESCRIPTION: Instruction and use of drills, files, threads and threading processes, basic lathe, drill press, and band saw operation, including precision measuring instruments. Fasteners, layout procedures, and basic hand tools are covered.

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.
7. Calculate speeds and feeds for machining.
8. Use clamping and other holding devices.

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 Crib Cleanup
- Tool Crib Cleanup
- Equipment Cleanup
- 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:  

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Implied Feature Grading Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
<td>A ± .000” - .002” of design specifications*</td>
</tr>
<tr>
<td>B</td>
<td>80% - 89%</td>
<td>B ± .0021” - .004” of design specifications*</td>
</tr>
<tr>
<td>C</td>
<td>70% - 79%</td>
<td>C ± .0041” - .007” of design specifications*</td>
</tr>
<tr>
<td>D</td>
<td>60% - 69%</td>
<td>D ± .0071” - .011” of design specifications*</td>
</tr>
<tr>
<td>F</td>
<td>&lt;60%</td>
<td>F &gt; .011” 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. Due Assignments are to be turned in before 5 minutes after the class is scheduled to begin, otherwise it will be considered Late Work*.
   b. Late Work will not be accepted unless absences are excused; and are due the following day.
   c. Corrected Assignments will be returned the Monday after they are corrected. If you are absent, acquire corrected assignments before or after class.
   d. Missed Assignments will be made available to students with excused absences only.

2. Tests: 35%
   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: 35%
   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 lab and equipment safety/training days to be allowed access to the lab. 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
- ¼” or 5/16” HSS lathe tool-bit
- ~½” HSS end mill (2 or 4 fluted)
- 4” or 6” Dial or Digital Caliper (no plastic calipers)

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. Gage Blocks
   2.2. Calipers
   2.3. Micrometers
   2.4. 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
      3.1.3. Tool steels
   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. Drills and drilling – Chapter 5 (pg. 139-173)
   7.1. Drill press identification
   7.2. Drill press processes
   7.3. Twist drills (pg142-151)
   7.4. Speeds and feeds
   7.5. Hold downs and fixtures
8. Engine Lathe Operation – Chapter 3 (pg. 43-99)
   8.1. Introduction and Safety
   8.2. Setup and Operation
9. Milling Machine Operation – Chapter 4 (pg. 100-138)
   9.1. Introduction and Safety
   9.2. Setup and Operation
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. Threads and Threading
    11.1. Bolt strength classification
    11.2. Thread size and classification
    11.3. Thread terms and definitions
    11.4. Hand taps and dies (pg. 155-160)
    11.5. Bolt and nut extraction
    11.6. Tap extraction
12. Numerical Control and CNC – Chapter 8 (pg. 267-288)

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 passing Blackboard safety tests and the proper management of machine setup, speeds, feeds, and depths of cut, for any given process.

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 MCH 114 Related Metal Processes:

Student Name (Print): ____________________________________________________________

Student Signature: ____________________________________________________________

Date Signed: ________________________________________________________________