Manufacturing Processes – ENGR 3350-001
Engineering
Spring 2020

A. COURSE INFORMATION

Course number/section: ENGR-3350_001
Class meeting time: LEC: 12:00 P.M. to 12:50 P.M. MW
Class location: Center for Science 115, Labs will be in RFEB 114
Course Website: https://bb9.tamucc.edu/webapps/portal/frameset.jsp, then go to the appropriate course section

B. INSTRUCTOR INFORMATION

Instructor: Ronald J. Carlson
Office location: EN 219
Office hours: MW 2:15 to 3:15
Telephone: (361) 825-3272
e-mail: ronald.carlson@tamucc.edu
Appointments: email, call, or visit with instructor to make an appointment

C. COURSE DESCRIPTION

Catalog Course Description
Introduction to metal and non-metallic manufacturing processes; casting, forging, rolling, extrusion, sheet metal forming, cutting tools turning and milling operations, abrasive machining, welding and joining powder compaction, molding, forming of plastics, surface treatment, human factors and safety.

Extended Course Description
Students will be prepared to work in a manufacturing environment

D. PREREQUISITES AND COREQUISITES

Prerequisites
ENGR 1312 - Foundations of Engineering II, ENGR 3320 - Strength of Materials and
ENGR 2326 - Dynamics, SMTE-0095 – Safety Training
Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References
Students will use online resources to supplement the text book.
Supplies
Engineering paper and a calculator

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

1. To understand and be able to explain mechanical behavior, testing, and manufacturing properties of Materials
2. To learn about and be able to explain physical properties of materials
3. To be able to explain the fundamentals of metal casting
4. To be able to explain the process of rolling of metals
5. To be able to explain about forging of metals
6. To explain extrusion and drawing of metals
7. To understand the fundamentals of machining and be able to describe some machining processes
8. To explain what properties of cutting-tools materials are important
9. To be able to explain about abrasive machining and finishing operation
10. To be able to explain joining processes (fusion welding, bonding, mechanical fastening)

By the end of this course, students should be able to:

1. Calculate the forces involved and power required to machine a part.
2. Determine the surface finish, Ra number, of a part given the surface measurements.
3. Describe the steps in the Lost Foam Casting process
4. Fabricate an assembly to test the torque capability of an interference fit.
5. Perform a statistical process control analysis
G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

Lecture with lab work. Lab work will consist of creating a two part assembly using a milling machine, and lathe. Students will practice 3D solid modeling using Inventor to design parts for an assembly.

Students will work in teams during the labs and will design and conduct experiments per the instructor’s directions.

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

Students will be evaluated on how well they participate in the lab work. As part of the lab grade, students will evaluate their teammates. Lab reports will be graded on technical content as well as presentation. Spelling and grammar are also considered. On problems, points will be deducted for incorrect answers, significant figures, not showing all the work, including unit conversions, and not following the proper procedure.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (2)</td>
<td>10 each</td>
</tr>
<tr>
<td>Quizzes</td>
<td>8</td>
</tr>
<tr>
<td>Homework</td>
<td>20</td>
</tr>
<tr>
<td>Lab Reports (2)</td>
<td>10 each</td>
</tr>
<tr>
<td>Tri-Weekly Reports (Total)</td>
<td>4 points</td>
</tr>
<tr>
<td>Final Exam</td>
<td>28</td>
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<tr>
<td>Unexcused absence and cell phone use</td>
<td>See section J</td>
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</tbody>
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Grades will be assigned using the following scale:
A: 100-90, B: 89-80, C: 79-70, D: 69-60, and F: 59-0.

**Rubric:**

- General rules for every assignment
  1. Not following the format for unit conversions and calculations – 3 % per instance.
     Example below:

\[ Q = \frac{80000 \text{ Barrels} \times 42 \text{ gallons} \times 231 \text{ inches}^3 \times \frac{1}{12 \text{ inches}} \times \frac{1}{24 \text{ hours}}}{\text{Day} \times \text{barrel} \times \text{gallon} \times \text{Day}^3 \times \text{hour}} = 18715 \text{ ft}^3 \]

- Excessive significant figures – 2 % per incident. Note: this applies only to the final answer. Please carry as many figures as possible in the intermediate calculations.
- Late arrival, 5 minutes or later after class began; you will not be allowed to sign in as
having attended class that day. In addition, you will not be allowed to take any quiz or test that has started.

Reports on Lab Experiments
4. Misspelled words – 1.0 % per word per instance
5. Words used incorrectly (vice rather than vise) – 2 % per instance
6. Equations not numbered – 1 % per equation
7. Writing in prose (story telling) versus numbered format – 0.25 % per item/step
8. Identifying a figure somewhere other than below the figure – 1.0 % per instance
9. Identifying a table somewhere other than above the table – 1.0 % per instance
10. Technical inaccuracies such as incorrectly stating the diameter of the drill bit – 1.0% per instance

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
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</thead>
<tbody>
<tr>
<td>Jan 22</td>
<td>Subtractive Machining Processes</td>
<td>21 to 25, and 27</td>
<td>Read chapters 21 to 25 and 27</td>
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<tr>
<td>Feb 12</td>
<td>Structure and Properties of Metals</td>
<td>Chapters 2 to 7</td>
<td>Read chapters 2 to 7</td>
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<td></td>
<td>Exam 1 Metal Alloys</td>
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<tr>
<td>Mar 2</td>
<td>Non-Metals</td>
<td>8, 20,</td>
<td>Read chapters 8 and 20</td>
</tr>
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<td>Mar 23</td>
<td>Measurement, Inspection, and Quality Control</td>
<td>9 to 12</td>
<td>Read chapters 9 to 12</td>
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<tr>
<td>Mar 30</td>
<td>Casting</td>
<td>13 to 15</td>
<td>Read chapters 13 -15</td>
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<tr>
<td>Apr 6</td>
<td>Exam 2</td>
<td></td>
<td>Read chapters 16 to 19</td>
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<tr>
<td>Apr 8</td>
<td>Powder Metallurgy and metal forming</td>
<td>16 to 19</td>
<td></td>
</tr>
<tr>
<td>Apr 22</td>
<td>Additive Manufacturing</td>
<td>33</td>
<td>Read 33</td>
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<tr>
<td>Apr 29</td>
<td>Joining</td>
<td>37 to 40</td>
<td>Read 37 to 40</td>
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<tr>
<td>May 6</td>
<td>Economics, Statistics, Special topics, etc.</td>
<td>to as far as we get</td>
<td>As assigned</td>
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<td></td>
<td>Last day of classes</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Final Exam</td>
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Note 1: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
J. **COURSE POLICIES**

**Attendance/Tardiness**
Absences are discourage and detrimental to learning and to your grade. However, it is the student's responsibility to obtain class notes, handout materials, etc. when a scheduled lecture is missed. Grading for Attendance will be deducted after the first absence. After the third absence a 0.5% deduction per absence will apply. If you accumulate 6 absences, you have a zero (half a letter grade) for this grading category Attendance/Tardiness.

**Late Work and Make-up Exams**
Late work, scheduled exam absences or No-show on lab/project will not be accepted unless there exists a legitimate excuses (illness, death in the immediate family, etc.) and adequate documentation is furnished. If a make-up were to be needed it could be a degree higher in difficulty.

**Extra Credit**
No extra credit will be given

**Cell Phone Use**
Cell phone use is prohibited once class begins. They are to be silenced and put away where they are not seen. If a call is expected take it out of the class. Anyone that interrupts class due to cell phone will be asked to leave.

**Laptop Use**
Laptops may be permitted if used for class work with the instructor’s permission.

**Food in Class**
No food is permitted. Only bottled water with a cap or sealable lid is allowed. Failure to comply will result in the student being asked to leave to correct the issue.

**Missed Exam**
You will receive a zero for a missed exam, unless you have made accommodations with Instructor or have a legitimate excuse. You are to communicate any issues immediately.

**Participation**
No extra points will be given.

**Others**
No other policies at this time. Any changes will be announced in class.
K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
• As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• Disability Services
  • The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  • If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  • http://disabilityservices.tamucc.edu/

• Statement of Academic Continuity
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.
L. OTHER INFORMATION

- Academic Advising
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.