Materials Science ENGR 3322
Department of Engineering
Spring 2020

A. COURSE INFORMATION

   Course number/section: ENGR 3322.002
   Class meeting time: TR 9:30-10:20 AM
   Class location: RFEB 108
   Laboratory sections: RFEB 118, .201 MW:2-3:15PM, .202 MW 3:30-4:45pm, .203 TR 3:30-4.45 PM

   Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION

   Instructor: Lecture: David Bridges
   Office location: RFEB 222E
   Office hours: 3:30-5:00 M, 1:00-3:00 T, 3:30-5:00 R
   Telephone: 361-825-2181
   e-mail: david.bridges@tamucc.edu
   Appointments: Non-office hour appointments must be scheduled in advance by email.

C. COURSE DESCRIPTION

   Catalog Course Description
   Structure and properties of metallic and nonmetallic materials; microstructure, mechanical testing, phase diagrams, heat treatment, testing, ceramics, polymers, composites, construction materials, failure analysis, nondestructive evaluation, corrosion and thermal properties of materials.

D. PREREQUISITES AND COREQUISITES

   Prerequisites
   CHEM 1411 - General Chemistry I and PHYS 2425 - University Physics I
   Corequisites
   None.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

   Required Textbook(s)
   Introduction to Materials Science for Engineers, 8th Edition, by James F. Shackelford,
   Optional Textbook(s) or Other References
   None.
   Supplies
   Scientific 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.

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

1. Demonstrate an understanding of various groups of materials, different material properties and the types of atomic bonding present in different materials.
2. Demonstrate an ability to classify and analyze crystalline structures and defects.
3. Demonstrate an understanding of mechanical behaviors of materials and apply the knowledge to conduct mechanical behavior experiments and analyze the results.
4. Demonstrate an understanding and analyze thermal behaviors of materials.
5. Demonstrate an understanding of phase diagrams and microstructure development.
6. Demonstrate an ability to classify and analyze structural materials for applications.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course is a foundational course for several other courses such as Strength of Materials, Manufacturing Processes, Solid Mechanics etc. This course will introduce you to new terminologies, concepts, and definitions that are used in the field of engineering related to materials. Therefore, this course will include understanding, memorizing and applying the terminologies learned during the semester. Getting all the material for each activity at one reading is not often achievable. The student may need to spend multiple sittings reading the material, preparing study materials to be properly prepared for exams.

Textbook Readings
Covering all the material that is in the text is not achievable in the provided lecture time. The student cannot rely solely on lecture notes to gain a deep and thorough understanding of the material. The student will need to read/review the material prior to the week of lecture.

Homework/Activities
Homework will be provided for selected topics. Homework assignments will be posted on Blackboard. Some assignments may be submitted, or conducted using BlackBoard, and some maybe submitted in class. In addition, some activities may be team based. Homework will count 15% of the course grade.

Lab Projects/Activities:
The projects and activities are part of the lab section. Students will conduct the project experiments in groups. The instructor for each lab section will make the assignments, grade the reports, and report the grades for inclusion in your course grade. The overall grade from
the lab will count 15% of your overall course grade.

**Semester Tests**
There are two one-hour tests in this course (see course schedule, below). These two tests will each count for 22.5% of the course grade. Therefore, the two tests combined will be counted for 45% of the course grade.

**Final Exam**
Final exam will be comprehensive of all of the topics and assignments covered in the course. It will count for 25% of the grade. Final exam will be scheduled as per university schedule.

### H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>Homework:</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab:</td>
<td>15%</td>
</tr>
<tr>
<td>Test 1:</td>
<td>22.5%</td>
</tr>
<tr>
<td>Test 2:</td>
<td>22.5%</td>
</tr>
<tr>
<td>Final Exam:</td>
<td>25%</td>
</tr>
</tbody>
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Grading scale: 90-100 = A  
80-89 = B  
70-79 = C  
60-69 = D  
< 60 = F

### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Chapter(s)</th>
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<tbody>
<tr>
<td>21 Jan 2020</td>
<td>1st day of class (University)</td>
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</tr>
<tr>
<td>21 Jan 2020</td>
<td>Mechanical Behavior (Metals)</td>
<td>6.1</td>
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<tr>
<td></td>
<td>Engineering materials</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Atomic Bonding</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Crystalline Structure – Perfection</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Crystal Defects and Noncrystalline Structure -- Imperfection</td>
<td>4</td>
</tr>
<tr>
<td>28 Jan 2020</td>
<td>Last day to late register or add a class</td>
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<tr>
<td>3 Mar 2020</td>
<td>Test No. 1: Chs. 1-4, 6.1</td>
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<tr>
<td>9-13 Mar 2020</td>
<td>Spring Break</td>
<td></td>
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<tr>
<td></td>
<td>Mechanical Behavior</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Thermal Behavior</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Failure Analysis and Prevention</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Phase Diagrams</td>
<td>9</td>
</tr>
<tr>
<td>10 Apr 2020</td>
<td>Last Day to Drop a Class</td>
<td></td>
</tr>
<tr>
<td>14 Apr 2020</td>
<td>Test No. 2: Chs. 6-9</td>
<td></td>
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<tr>
<td></td>
<td>Kinetics -- Heat Treatment</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Material from Chs. 11, 12, 13 as time permits</td>
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</tr>
<tr>
<td>6 May 2020</td>
<td>Last Day of Class (University)</td>
<td></td>
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<tr>
<td>14 May 2020 (Thu)</td>
<td>8:00-10:30 AM Final Exam -- comprehensive</td>
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Dates and topics for tests are tentative and may be changed. At least one week’s notice will be given for a change in test schedule. Changes will be announced in class and via Blackboard and/or e-mails.

J. COURSE POLICIES

Attendance
Attendance will be taken daily and reported at the end of the semester. No part of your grade will be based specifically on attendance; however, regular attendance in class will significantly improve your performance on homework, tests, and final exam.

Tests and Final Exam
Tests will be closed book, closed notes, with use of only of a calculator. Tests will be a combination of concepts, vocabulary, short work out problems, and full work out problems similar to homework. The final exam will be comprehensive in material.

Missed tests: Those excuses that fall under university approved will merit a makeup quiz. Missing a quiz due to illness will require evidence from a clinic and will be given at discretion of the instructor. Make up exams and quizzes will not be the same as administered to the class.

Homework
Problems will be assigned for the student to work on so that they can develop their skill on applying particular topics. Some problems will be required to be submitted, but not all problems will be collected. Homework, when collected, will be collected on a due date stated when the assignment is given.

Student Collaboration: Some homework assignments will be designated as team assignments. On these assignments, students may work in teams of up to but not more than three students. A student should be a member of one team only. You are not required to work on a team on such an assignment. If you do work on a team, each team member should turn in his or her own copy of the assignment, listing the other team members who worked on the assignment under that student’s name (i.e., each team member will turn in a copy of the assignment with his or her name at the top and the other team members listed below). Collaboration on homework is encouraged. It can help many of you to understand the ideas better if you explain them to each other. Collaboration to understand problems and concepts is how best to succeed in the working world. It is important that each student fully understands the material as there will be no collaboration on quizzes or exams.

Late Homework: Once homework has been returned and/or solutions posted, no homework will be accepted. Homework submitted after due date will be reduced by 25%.

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.