Materials Science
School of Engineering and Computing Sciences
Fall 2016

A. COURSE INFORMATION

Course number/section: ENGR 2322.W01
Class meeting time: Lec: Fully Online
Class location: Blackboard
Laboratory sections: EN 118, MW:2-3.15PM or TR 12.30-1.45PM or TR 2-3.15 PM
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Lecture: Dr. Magesh Thiyagarajan
Office location: EN 222D
Office hours: TR 10 AM – 12 PM, W 1 PM – 2 PM
Telephone: 361-825-2144
e-mail: magesh.thiyagarajan at 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 and laptop.
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

The instructional method will follow a fully online Instruction method for lectures. In an online instruction based course, you will follow the weekly course modules in blackboard which will contain my weekly audio-visual lectures and other learning materials. Afterwards, you will be required do the textbook readings and perform weekly assignments provided in blackboard. This approach will offer more flexibility for student learning and access to lectures as needed for review throughout the semester.

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 and definitions of terminologies that are used in the field of engineering related to materials. Therefore, this course expectation will include understanding, memorizing and applying the terminologies learnt during the semester. If you have difficulty in memorization from the book, I recommend you prepare flash cards and practice regularly.

STEP 1: Audio-Visual (AV) Lectures

First step of this blended class is to listen to the weekly AV lectures. The class lectures are provided in an audio-visual (AV) lecture format in blackboard as per the class schedule. The AV lectures are replacements to the in-class lectures. I have created these AV lectures hoping that, it will be very beneficial to students in terms of the flexibility to listen to the lecture at student’s convenient time as well as convenient location that aid better learning. It will also give you the ability to pause whenever necessary and resume at a later time. In addition, access to these AV lectures at any number of times during the semester and it will also be
helpful for review for quizzes and exams. These may not be possible in in-class lectures. It is recommended that students take notes of key concepts during the AV lectures.

**STEP 2: Textbook Readings**
The second step following the completion of weekly AV lectures is the weekly textbook readings, which are given at the end of the AV lectures. After completing AV lectures, the textbook readings should be completed before attempting any assignments or quizzes.

**STEP 3: Homework**
Homework will be provided for selected topics (see Section I) and they must be completed in blackboard. The homework questions will be posted at the beginning of the week and the answers for the homework must be submitted in blackboard before the due date, anytime before the end of the week (Sunday by 11 pm CST)

**Quizzes**
There will be weekly quizzes in blackboard, on each weekly module. The quizzes generally include concept, vocabulary, and terminology type questions. It will not include any numerical problems. Each quiz will be timed and will have 15-25 questions depending on the difficulty level of the chapter. The weekly quizzes will be available to take throughout the week, but it must be completed before the due date, anytime before the end of the week (Sunday by 11 pm CST). No exceptions. Each attempt has an ample time limit of 60 mins. If you have studied the lecture and textbook then 60 mins is plenty of time to complete the quiz. Quizzes are graded automatically by the blackboard, and therefore the answers must match exactly with the textbook, both in terms of concept as well as the diction. No grace points will be offered for incorrect answers. The main purpose of the quizzes is to prepare you for the exams. The quiz is a means of assessing your understanding of the concept. Your incorrect questions will be shown to you only once right after the completion of the quiz. It will not be reopened for review again.

**Lab Projects**
The projects are part of the lab section. Students will conduct the project experiments in groups. However, students are required to **independently analyze the data, collect additional information and images, prepare and submit individual project reports** by the assigned due date. Using other students images or graphs or any other information besides the raw numerical data collected from current or past semesters in the report will be considered as plagiarism and will be subjected to the university rules on plagiarism.

**Term-Exams**
There are two term exams in this course that are scheduled as per the class schedule. The first and second term-exams will each count for 15% of the grade. Therefore the two term-exams combined will be counted towards 30% of the grade.

**Final Exam**
Final exam will be comprehensive of all of the topics and assignments covered in the course. It will count for 30% of the grade. Final exam will be scheduled as per university schedule.
H. MAJOR COURSE REQUIREMENTS AND GRADING

Homework: 10%;  Weekly Quizzes: 20%; Lab Projects 10%
Term-Exam-1: 15%; Term-Exam-2: 15%; Final Exam: 30%

Grading Scale:
A = 90 and above; B = 89.99 – 80; C = 79.99 – 70; D = 69.99 – 60; F = below 60

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (Week of.)</th>
<th>TOPICS</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 24 (Week 1)</td>
<td>Introductions, Syllabus, Course Overview, Pre-requisites</td>
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<tr>
<td>Aug. 29 (Week 2)</td>
<td>Materials for Engineering</td>
<td>Chapter 1</td>
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<tr>
<td>Sep. 5 (Week 3)</td>
<td>Atomic Bonding*</td>
<td>Chapter 2</td>
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<td>Sep. 12 (Week 4)</td>
<td>Crystalline Structures*</td>
<td>Chapter 3</td>
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<tr>
<td>Sep. 19 (Week 5)</td>
<td>Crystalline Defects</td>
<td>Chapter 4</td>
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<td>Sep. 26 (Week 6)</td>
<td>Term Exam – 1 (Chapters: 1 through 4)</td>
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<tr>
<td>Oct. 3 (Week 7)</td>
<td>Mechanical Behavior*</td>
<td>Chapter 6</td>
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<td>Oct. 10 (Week 8)</td>
<td>Failure Analysis</td>
<td>Chapter 8</td>
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<td>Oct. 17 (Week 9)</td>
<td>Thermal Behavior*</td>
<td>Chapter 7</td>
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<tr>
<td>Oct. 24 (Week 10)</td>
<td>Phase Diagrams*</td>
<td>Chapter 9</td>
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<tr>
<td>Oct. 31 (Week 11)</td>
<td>Term Exam – 2 (Chapters: 6 through 9)</td>
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<tr>
<td>Nov. 7 (Week 12)</td>
<td>Heat Treatment</td>
<td>Chapter10</td>
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<tr>
<td>Nov. 14 (Week 13)</td>
<td>Metals, Ceramics and Glasses</td>
<td>Chapter 11</td>
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<tr>
<td>Nov. 28 (Week 14)</td>
<td>Review</td>
<td>Chapters 1-4, 6-11</td>
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Final Exam (Chapters 1-4, 6-11) (as per university final exam schedule)

Note: The above schedule is tentative. Changes in this course schedule may be necessary and will be announced to the class by the Instructor.

*indicates Chapters that are more challenging and contains numerical problems and homework.
J. **COURSE POLICIES**

**Attendance/Tardiness**
Attendance will be taken in Lab sections. Blackboard usage will be monitored.

**Late Work and Make-up Exams**
Late work will not be accepted. No make-up exams will be provided.

**Extra Credit**
Extra credit may be offered for extraordinary performances or contributions.

**Cell Phone Use**
Use of cell phones is strictly prohibited to use in lab due to the overwhelming amount of distraction that may cause to the focus on student learning. Students who violate this policy will lose the attendance grade allocated.

**Laptop Use**
Usage of laptops or tablets for course related work are permitted in lab and allowed only when instructed by the instructor.

**Food in Class/Lab**
Not permitted in class.

**Missed Exam**
No credits will be given for any missed assignments, quizzes and exams and there will not be any make-up exams.

**Participation**
Active participation is required.

K. **COLLEGE AND UNIVERSITY POLICIES**

- **Academic Integrity (University)**
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior. See Full University Policy at [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

- **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.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do.
Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must be submitted. No student is eligible to receive a W without completing the official drop process by this deadline. 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](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/](http://disabilityservices.tamucc.edu/)

L. **OTHER INFORMATION**

  None.

**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.