**Materials Science ENGR 2322**  
School of Engineering and Computing Sciences  
Spring 2017

**A. COURSE INFORMATION**

- **Course number/section:** ENGR 2322.002  
- **Class meeting time:** Lec: Blended Instruction (TR 3:30-4:45PM)  
- **Class location:** Lecture: BH 104, Lab: EN 118  
- **Course Website:** https://bb9.tamucc.edu/

**B. INSTRUCTOR INFORMATION**

- **Instructor:** Lec: Dr. Magesh Thiyaga Rajan  
- **Office location:** EN 222D  
- **Office hours:** MW 9.30 – 12 PM  
- **Telephone:** 361-825-2144  
- **e-mail:** magesh.thiyagarajan@tamucc.edu  
- **Appointments:** Non-office hour appointments must be scheduled in advance through 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**

- **Pre-requisites**  
  CHEM 1411 - General Chemistry I and PHYS 2425 - University Physics I  
- **Co-requisites**  
  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 a laptop or tablet are required.
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 Blended Instruction method with up to 84% of semester instruction will be held through Online Instruction method and up to 16% of the instruction will be held through face-to-face in-class instruction. In the online instruction portion of the course, you will follow the weekly course modules that will be posted in blackboard every week that will contain my 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. In the face-to-face in-class instruction portion, review of concepts, materials, problem solving, case studies, quizzes and exams will be conducted.

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.

**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.

**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.

**Homework**
Homework will be provided for selected topics 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.

**Quizzes**
There will be weekly quizzes in blackboard, on each topic. 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 and has a time limit of 60 mins. 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.

**Projects**
The projects are part of the lab section. Students are required to submit individual project reports for each project in Blackboard before the due date. 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 in Blackboard by the assigned due date. Using other students images or graphs or any other information besides the 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. The project start dates and due dates will be provided in the first day of class.

**Term-Exams**
There are two term exams in this course that are scheduled as per the class schedule. The first term-exam will cover Chapters 1 through 4 for 15% of the grade. The second term-exam will cover Chapters 6 through 10 for 15% of the grade. Therefore the two term-exams combined will be counted towards 30% of the grade.

**Final Exam**
The final exam will be comprehensive of all of the topics and assignments covered in the course. It will include Chapters 1 through 15, except Chapter 5. The 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>CHAPTER - TOPICS</th>
<th>ASSIGNMENT</th>
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<tbody>
<tr>
<td>Jan. 19 (Week 1)</td>
<td>Introductions, Syllabus, Course Overview, Pre-requisites</td>
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<tr>
<td>Jan. 23 (Week 2)</td>
<td>Chapter 1: Materials for Engineering</td>
<td>Quiz</td>
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<td>Jan. 30 (Week 3)</td>
<td>Chapter 2: Atomic Bonding*</td>
<td>Quiz &amp; Homework</td>
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<td>Feb. 6 (Week 4)</td>
<td>Chapter 3: Crystalline Structures*</td>
<td>Quiz</td>
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<tr>
<td>Feb. 13 (Week 5)</td>
<td>Chapter 4: Crystalline Defects</td>
<td>Quiz</td>
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<td>Feb. 20 (Week 6)</td>
<td>Term Exam – 1: Chapters 1 through 4</td>
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<tr>
<td>Feb. 27 (Week 7)</td>
<td>Chapter 6: Mechanical Behavior*</td>
<td>Quiz &amp; Homework</td>
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<td>Mar. 6 (Week 8)</td>
<td>Chapter 8: Failure Analysis</td>
<td>Quiz</td>
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<tr>
<td>Mar. 20 (Week 9)</td>
<td>Chapter 7: Thermal Behavior*</td>
<td>Quiz &amp; Homework</td>
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<tr>
<td>Mar. 27 (Week 10)</td>
<td>Chapter 9: Phase Diagrams*</td>
<td>Quiz &amp; Homework</td>
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<tr>
<td>Apr. 3 (Week 11)</td>
<td>Term Exam – 2: Chapters: 6 through 9</td>
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<td>Apr. 10 (Week 12)</td>
<td>Chapter10: Heat Treatment</td>
<td>Quiz</td>
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<td>Apr. 17 (Week 13)</td>
<td>Chapter 11: Metals, Ceramics and Glasses</td>
<td>Quiz</td>
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<tr>
<td>Apr. 24 (Week 14)</td>
<td>Chapters 1-4, 6-11 Review</td>
<td>Quiz</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 with numerical problems and homework.
J. **COURSE POLICIES**
   
   **Attendance/Tardiness**
   Attendance will be taken during the in-class meetings.

   **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 class or lab, without prior approval. Students who violate this policy will lose 2% of final grade for each time.

   **Laptop Use**
   Usage of laptops or tablets for course related work are permitted in class or 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. 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/

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.