A. **COURSE INFORMATION**

   **Course number/section:** ENGR 2322.001  
   **Class meeting time:** Lecture MW 01:00-01:50PM; Lab MW 02:00-03:15PM  
   **Class location:** EN 107  
   **Course Website:** https://bb9.tamucc.edu/

B. **INSTRUCTOR INFORMATION**

   **Instructor:** Dr. Magesh Thiyagarajan  
   **Office location:** EN 222D  
   **Office hours:** TBD  
   **Telephone:** 361-825-2144  
   **e-mail:** magesh@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.

   **Extended Course Description**
   Electronic materials, optical materials, magnetic materials, sustainable materials, materials selection in engineering design.

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)**

   **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 crystalline 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 of thermal behaviors of materials and apply the knowledge to conduct thermal behavior experiments and analyze the results.
5. Demonstrate an understanding of the fundamentals of phase diagrams and microstructure development.
6. Demonstrate an understanding of structural, electronic, optical and magnetic materials and apply the knowledge to perform materials selection for engineering design based on application requirements.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The instructional method will follow a Blended Instruction with 84% Online Instruction method. In an online instruction based course, you will follow the weekly course modules in blackboard which will contain 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 your 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.

Supplemental Instruction (SI)
There will be a supplemental instruction provided through either on-campus or online instruction. There will be multiple sessions scheduled for each week. Attendance to at least one of the sessions in each week is required and will be counted towards the attendance grade. Supplemental instruction will especially cover the numerical homework problems.

Homework
Homework will be provided for selected topics and they must be completed in blackboard. The supplemental instruction will be a good resource for learning or clarifying any questions on completing the homework.

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. There will be negative points for wrong answers in some of the multiple choice and multiple answer type questions. The weekly quizzes will be available to take throughout the week, but it must be completed before the due date. No exceptions. Two attempts will be allowed and highest score of the two attempts will be used towards the grade. 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.
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

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Weekly Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Term-Exam 1</td>
<td>15%</td>
</tr>
<tr>
<td>Term-Exam 2</td>
<td>15%</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Project Reports</td>
<td>10%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
</tbody>
</table>
### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (Week of.)</th>
<th>TOPICS</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 26 (Week 1)</td>
<td>Introductions, Syllabus, Course Overview, Pre-requisites</td>
<td></td>
</tr>
<tr>
<td>Aug. 31 (Week 2)</td>
<td>Materials for Engineering</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>Sep. 7 (Week 3)</td>
<td>Atomic Bonding</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>Sep. 14 (Week 4)</td>
<td>Crystalline Structures</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>Sep. 21 (Week 5)</td>
<td>Crystalline Defects Exam-1</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Sep. 28 (Week 6)</td>
<td>Mechanical Behavior</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>Oct. 5 (Week 7)</td>
<td>Thermal Behavior</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>Oct. 12 (Week 8)</td>
<td>Failure Analysis</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Oct. 19 (Week 9)</td>
<td>Phase Diagrams</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>Oct. 26 (Week 10)</td>
<td>Heat Treatment Exam-2</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>Nov. 2 (Week 11)</td>
<td>Metals, Ceramics and Glasses</td>
<td>Chapter 11</td>
</tr>
<tr>
<td>Nov. 9 (Week 12)</td>
<td>Polymers and Composites</td>
<td>Chapter 12</td>
</tr>
<tr>
<td>Nov. 16 (Week 13)</td>
<td>Electronic Materials</td>
<td>Chapter 13</td>
</tr>
<tr>
<td>Nov. 23 (Week 14)</td>
<td>Optical and Magnetic Materials</td>
<td>Chapter 14</td>
</tr>
<tr>
<td>Nov. 30 (Week 15)</td>
<td>Materials Selection</td>
<td>Chapter 15</td>
</tr>
</tbody>
</table>

Final Exam  
(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.
J. COURSE POLICIES

Attendance/Tardiness
Attendance will be taken regularly in the SI sessions. There will be multiple SI sessions scheduled for each week and attendance to at least one of the sessions in each week is required and will be counted towards attendance credits.

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 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 class or lab and allowed only when instructed by the instructor. Students who violate this policy of using laptops or tablets for non-class related activities will lose the attendance grade allocated.

Food in Class
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

• 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.
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 by November 6, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must submitted. After November 6, 2015 a student will not be allowed 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](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**
  Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to [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.