Course Number & Title: MECE 6316-01 Advanced Materials Engineering
Semester: Fall 2018
Class schedule and location: Tue 5:55 pm-8:25 pm, Engineering Building 1.242
Instructor: Dr. Mataz Alcoutlabi
Office: Eng. 3.238
Office Hours: TR: 12:30 PM-1:45 PM
Email: mataz.alcoutlabi@utrgv.edu
Website: http://faculty.utrgv.edu/mataz.alcoutlabi/

Textbook: None
Lecture notes will be available on Blackboard

Resource Material and reference book:
Materials science and engineering an introduction by William D. Callister.
Mechanical behavior of materials by Thomas H. Courtney.
Introduction to design and analysis with advanced composite materials by Steven .R. Swanson

Prerequisites: “C” or better in MECE 2340 Materials Engineering

Course Description:
This course provides an overview, at the graduate level, of the broad area of advanced materials engineering
and nanoengineered materials by emphasizing on the relationships between the structure, processing,
properties and performance of these materials. Major topics will include spectroscopic and characterization
techniques and, processing methods of advanced materials including polymers, metals, ceramics, and
composites/nanocomposites. The reminder of the course will cover interfaces in composites, phase diagrams
of binary, ternary systems and will provide an opportunity to introduce students to materials for several
applications such as aerospace, biomedical, semiconductor, sensors, nanodielectrics and energy storage
devices. This course will also provide students with a broad understanding of cutting edge development in
nanomaterials, nanofibers, nanocomposites, and their potential applications in high-technology (or high-tech)
and nano/bio technology.

Course Outcomes
1. To understand and develop cognitive understanding of advanced materials concepts.
2. To understand and apply method and appropriate technology for the synthesis, processing and
characterization of advanced materials.
3. Explain the basic structure of advanced materials and relate structures to their engineering properties and
performance.
4. To identify and recognize the differences among competing scientific concepts for the optimization of the
properties and performance of advanced materials.
5. To recognize scientific and quantitative methods and the differences between these approaches and other
methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing

Grading Policies
Midterm exam I 20%
Midterm exam II 20%
Final exam 25%
Homework and quizzes 20%
Project presentation and report 15%
Final grades are assigned according to the following grading policy:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>90 and above</td>
<td>A</td>
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<tr>
<td>80-89.9</td>
<td>B</td>
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<tr>
<td>70-79.9</td>
<td>C</td>
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<tr>
<td>60-69.9</td>
<td>D</td>
</tr>
<tr>
<td>59.9 and below</td>
<td>F</td>
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Homework:
Homework must be submitted neatly on 8.5" by 11" paper. It should be stapled in the top left corner and hole-punched for a standard 3-ring binder. Grid engineering paper is preferred. Only one side of the paper should be used; the back side should be left blank to be used later for corrections and review.

As in most any Engineering course, the material is best mastered through practice. Homework is one’s best opportunity to practice the concepts learned in lecture. Moreover, the material in this course can only be mastered through practice. As such, what matters most is one’s genuine and active participation. Note that homework accounts for 10% of the final grade. Assignments will be graded based on effort demonstrated and not on whether the solution is correct. The rubric below will be used for grading.

Score Description
5, Excellent All problems were attempted.
   All work is shown.
   Solutions were neat, and use required format.
4, Good Nearly all problems were attempted (missing 1 at most).
   Steps were sufficiently detailed.
3, Fair Most problems were attempted (missing at most 2 problems).
   Steps may not be sufficiently detailed.
2, Poor Majority of problems were attempted.
   Steps were missing, or solutions were incomplete.
1, Unacceptable A few problems were attempted.
   Solutions were incomplete.
   Work was missing for most of problems.
0, Missing Assignment was not submitted.

Homework is mandatory and must be submitted in a timely fashion. Late homework will not be accepted without prior approval. If you have an exigent circumstance, contact Dr. Alcoutlabi immediately to make arrangements prior to the due date. Those that make a concerted effort to attempt each problem and submit their work on time can be rewarded.

Though students are encouraged to collaborate on homework assignments, the work submitted should reflect the student’s own effort and understanding of the material. If there is evidence that the student is copying solutions from another or a solution manual, the incident will be reported to the Dean of Students Office as required by the Student Conduct Code (see section below on Academic Integrity and Dishonesty for further details).

Quizzes:
There will be an in-class quiz on T over 1 problem from the homework assignments due since the last quiz.

Topics and Course Schedule

Week 1
Engineering materials and nature of materials: metals, ceramics, polymers and composites.

Week 2
Advanced materials: Smart materials and Nanoengineered materials
Week 3
Mechanical properties of advanced materials

Week 4
Mechanical and viscoelastic properties of advanced materials:

Week 5:
Thermal and electrical properties of advanced engineering materials

Week 6:
Phase diagrams of binary and ternary systems, Semi-Solid Alloys /Exam I/

Week 7:
Processing of Advanced Engineering Materials

Week 8:
Processing of Advanced Engineering Materials

Week 9:
Characterization and spectroscopic Techniques of Advanced Materials Engineering

Week 10:
Mechanical Modeling of Advanced Materials Engineering

Week 11:
Applications of Smart Materials and Nanomaterials: Energy storage devices, filtration, electronics, packaging, tissue engineering and biosensors.

Week 12:
Special topic on metallic/ceramic/polymer nanocomposites for food science and packaging /Exam II/

Week 13:
Project Presentations

Week 14:
Project Presentations

Week 15:
Project Presentations & Final Report due

Attendance:
1. Attendance will be taken every time the class meets. Any student arriving to class 5 minutes after the class has started will not be allowed in class. Students will be allowed a maximum of two absences for the whole semester. Five points will be deducted from the total (100%) for each absence exceeding the maximum allowable unless documentation justifying that absence is provided.
2. Students will not be permitted to leave the classroom during lectures and exams except for extreme emergencies.
**Homework and Exams:**
1. Absolutely no late assignments will be accepted.
2. Absolutely no cell phones, laptops, iPads, iPods, or any other smart technology devices are allowed in exams.
3. Make-ups for in-class exams for documented emergencies will be scheduled during the last week of class.

**Scholastic Integrity:**
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism, and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

**Drop Policy:**
Students can withdraw from a course through the Office of the Registrar on or prior to:
- September 12th, 2018, Wednesday: Last day to drop a class before it appears on the transcript and counts toward the "6-drop" limit. Last day to receive a 100% refund for dropped classes (other policies apply when a student is withdrawing from all classes).
- November 14th, 2018, Wednesday: Drop/Withdrawal Deadline; last day for students to drop the course and receive a "DR" grade. After this date, students will be assigned a letter grade for the course that will count on the GPA.

**Course Drops:**
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

**Students with Disabilities:**
Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact Student Accessibility Services (SAS) as soon as possible to schedule an appointment to initiate services. Accommodations can be arranged through SAS at any time, but are not retroactive. Students who suffer a broken bone, severe injury or undergo surgery during the semester are eligible for temporary services. **Brownsville Campus:** Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at ability@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at ability@utrgv.edu.

**Sexual Harassment, Discrimination, and Violence:**
In accordance with UT System regulations, your instructor is a “responsible employee" for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](http://www.utrgv.edu/equity), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.
**Course Evaluation:**
Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Online evaluations will be available **Nov. 15 – Dec. 5, 2018**. Students who complete their evaluations will have priority access to their grades.
ACKNOWLEDGEMENT OF RECEIPT OF SYLLABUS

By signing below, I hereby affirm that I have received a copy of the syllabus for MECE 6316 Advanced Materials Engineering and have been informed by the Instructor that it is my responsibility to carefully read and understand this document and abide by all its content. I also agree to prepare and submit to the Instructor, at the end of the semester, a folder that contains all my homework assignments, quizzes, exams, projects, reports and/or literature review (if applicable).

__________________________________________
Student ID Number

__________________________________________
Printed Name

__________________________________________
Signature

__________________________________________
Date