Boston University College of Engineering

ME 306
Prerequisites: CAS PY 212 (PY 313 recommended)

Introduction to Materials Science

Spring 2018

Instructor:

Instructor	Prof. Emily Ryan
Office	110 Cummington Mall, Room 416
Email	ryanem@bu.edu
Phone	617-353-7767
Office Hours	Tuesdays 11-12pm or by email (response within 24 hours)
Class Hours	A1 – Tues, Thurs 1:30-3:15pm A2 – Tues, Thurs 9:00-10:45am
Classroom	A1 – PHO 203 A2 – PHO 117

Laboratory Coordinator: Kara Mogensen
karam@bu.edu
617-358-1565

Laboratory Hours:	Monday, Wednesday, Friday	10:10-11:55am
	Monday, Wednesday	2:30-4:15pm
	Tuesday, Thursday	9:00-10:45am; 3:30-5:15pm
	Labs take place in EPIC	
	Students may sign up for any laboratory section	

Teaching Assistants:
(GTAs are not assigned to individual sections, but are available to all students)

GTA	Zhihao Sun	Shivangi Kataria	Quang Ha
Office	750 Comm Ave, B08	PHO609	ENG 402
Email	zhs@bu.edu	sk18@bu.edu	qth20@bu.edu
Office Hours: (Students may attend any)	Mondays 10-11AM	Fridays 11AM-12PM	Wednesdays 3-4PM

Discussion Sections:	Friday 1:25-2:15pm, 2:30-3:20pm	EPC 208
	Friday 3:35-4:25pm	PHO 202
	Friday 4:40-5:30pm	PHO 201
	Wednesday 9:05-9:55am	SED 208
	Students may sign up for any Discussion Section	

Course Materials:

Textbook:	*Materials Science and Engineering: An Introduction (Ninth Edition)*, by William D. Callister, Jr., John Wiley and Sons 2013
Reference book:	*Essentials of Materials Science and Engineering* (Second Edition), by Donald R. Askelund and Pradeep P. Fulay, Cengage Learning 2009
Website:	Blackboard (http://learn.bu.edu)

Course Description: Structure and properties of solids; crystalline structure; defect structures; atom movement and diffusion; nucleation and growth; deformation; phase diagrams; strengthening mechanisms; heat treatment; ferrous/nonferrous alloys; ceramics; polymers; composites. Includes lab.

Course Outcomes:
As an outcome of completing this course, students will:

1. Gain an understanding of the fundamental principles of materials science.
2. Gain exposure to different classes of engineering materials.
3. Gain laboratory experience in the area of processing/structure/property correlations in materials.
4. Gain experience in working in a team environment.
5. Gain experience in communicating key engineering results in the form of class presentations and project reports.
6. Gain a clear understanding of laboratory safety issues.

Topics Covered:

Chapter 1:	Introduction to Materials
Chapter 2:	Atomic Structure and Interatomic Bonding
Chapter 3:	The Structure of Crystalline Solids
Chapter 4:	Imperfections in Solids
Chapter 5:	Diffusion
Chapter 6:	Mechanical Properties of Metals
Chapter 7:	Dislocations and Strengthening Mechanisms
Chapter 8:	Failure
Chapter 9:	Phase Diagrams
Chapter 10:	Phase Transformations in Metals
Chapter 12:	Structure and Properties of Ceramics
Chapter 14:	Polymer Structures
Chapter 15:	Characteristics, Applications, and Processing of Polymers
Chapter 16:	Composites
Chapter 17:	Corrosion and Degradation of Materials

Class Policies and Course Components

Communication: Questions about Homework problems, Exam/Quiz review topics, Labs and General course questions should be posted to the appropriate Discussion Board on Blackboard. To insure fair access of information to all students, questions concerning any course material sent to either the Instructor or TAs via email will not be answered via direct email, only through Discussion Boards.

Homework: Homework assignments for the semester are posted on Blackboard. Homework is not collected or graded but is highly recommended.

Quizzes: 8 Quizzes will be given during discussion section. The lowest 2 quiz grades will be dropped.

Exams: There will be 2 examinations, 1 hour and 50 minutes each, during the semester.

Exam 1	Thursday March 15
Exam 2	TBD

- To be fair to all students, make-up or early exams are not an option. Missing an exam due to vacation or early departure for a scheduled break is not excusable. Arrangements will be made on a case-by-case basis for documented medical/University conflicts or other emergencies.

- Students requiring additional time to complete examinations must supply proper documentation from Disability Student Services at ***least 3 days in advance*** of an examination to the instructor so suitable arrangements can be made.
- Calculators are allowed during exams; all other electronic devices (cell phones, smart phones, laptops, tablets, etc.,) are prohibited.

Discussion Sections: Discussion sections are an opportunity for you to go over homework questions and concepts from class. Attendance is not required but quizzes are given periodically and count as 15% of your course grade. Discussion sections will NOT be held the following weeks:
January 15-19; February 26-March 2; March 5-9; March 12-16.

Labs: There are four laboratory assignments during the semester.

- Students should attend their scheduled laboratory times. Making up of missed labs will be permitted only when the lab is missed for a valid reason. Valid reasons include serious illness or observance of a religious holiday.
- Except in cases of extreme emergency, any absence must be approved – in writing – by Prof. Ryan prior to the scheduled laboratory time.
- By 10PM the day before your lab you must submit the pre-lab survey which is available on Blackboard. (i.e. if you lab is Monday 10:10-11:55 you must submit your pre-lab by 10PM on Sunday)
- Students will not receive credit for turning in a laboratory report if they have not physically completed the laboratory exercise.
- Laboratory reports are due at 4pm on the date listed. They should be uploaded to Blackboard under the appropriate assignment. Late reports WILL NOT be accepted without prior approval of the course instructor.

Laboratory Schedule (Divided into Group A/B)

Lab Safety:	January 22-26
Lab #1:	Group A: January 29-February 2; Group B: February 5-9
Lab #1 Report Due:	Group A: February 9; Group B: February 16
Lab #2:	Discussion Sessions February 12-16; February 13 and 15 11AM-1PM
Lab #2 Report Due:	February 23
Lab #3:	Group A: March 19-23; Group B: March 26-30;
Lab #3 Report Due:	Group A: March 30; Group B: April 6
Lab #4:	Group A: April 2-6; Group B: April 9-13
Lab #4 Report Due:	Group A: April 13; Group B: April 20

Video Presentation: At the beginning of every class we will have a video presentation by 3-4 students on a relevant materials science topic.

- The video should be 5 minutes or less and should be relevant to the topic of the day. The topics of the day are listed on the video presentation signup sheet which is posted to Blackboard.
- A link to the video needs to be submitted to Prof. Ryan (ryanem@bu.edu) **by 8 pm the day before** your presentation.
- Every student in the class will present once
- In addition to showing the video, each group will discuss why they chose the video and what aspect(s) of materials science are covered.
- A 1 page summary of why they chose the video and what aspect(s) of materials science are covered by it must be submitted to Prof. Ryan via email (ryanem@bu.edu) by 5PM on the day you present the video.

Materials Design Challenge:

- Working in groups of 3-4 you will submit a five page report on the materials design challenge topic.
- The report should be based on scientific literature and address the design criteria of the challenge.
- All group members must assist in the research and writing of the report, and all are responsible for the content of the entire report, including its accuracy, citations, grammar, and spelling.
- At least 10 scientific sources should be referenced. This can include peer reviewed journal articles, textbooks, patents, or conference proceedings.
- All references must be properly cited and included in the bibliography, and should use the format from Elsevier's Journal of Power Sources (https://www.elsevier.com/journals/journal-of-power-sources/0378-7753/guide-for-authors).
- Group members must be different then the video presentation groups.

Course Grading:

Grading for ME 306 is broken down as following:

Video Presentation:	10%
Materials Challenge:	10%
Lab Reports:	15%
Quizzes:	15%
Exam 1:	25%
Exam 2:	25%
Total:	100%

It is the student's responsibility to check with Prof. Ryan to make sure that all grades have been recorded correctly, and that you are not missing any points on the grade sheet. Inquiries about test and lab scores will be accepted up to 2 weeks after the assignment is returned. Beyond that, there will be no change in grades.

Classroom Courtesy: To persevere an open and distraction-free learning environment for all students, the following policies apply:

- Cell phone use is not permitted in class or during exams. This includes calls, texting, web browsing, games, etc.
- Quiet, odor-free snacks and closed drinks are permitted during class; students who arrive late having purchased food, or are consuming noisy, crunchy, etc. food will be asked to leave the classroom.
- Students disrupting class or distracting their classmates will be asked to leave the classroom.

Boston University Academic Conduct Code*:* Honesty is a core value of Boston University. Any violations of the BU academic honesty and integrity standards ***will be pursued*** through appropriate University channels. This includes, but is not limited to: cheating, plagiarism and misrepresentation. If you have any questions as to what constitutes an honor code violation, please ask. ***Ignorance is not an excuse for cheating***. You may access the BU Academic Conduct Code at: http://www.bu.edu/academics/policies/academic-conduct-code/

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I have read the entire syllabus and understand that I am responsible for following the policies and deadlines outlined in the syllabus.

Name: _____

BUID: _____

Signature: _____