Engineering Materials (EGR–331)

Block 3 – 2018

General Information:

Instructor: Brian Johns

Office: 015A West Science

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Office Hours: 11:00 am – 12:00 pm TThF or by appointment

Prerequisite:

EGR 231: Engineering Mechanics

Course Meeting Times:

West Science 002

MW 10:00 am – 11:45 am & 1:00 pm – 3:00 pm in WS 002

TTh 12:30 pm – 3:00 pm in Cole Library 212 (10/25 will be in WS 002)

F 9:00 am – 11:00 am in WS 002

Required Textbook:

Ashby, M.F., Jones, D.R.H. (2012). *Engineering Materials 1* (Fourth Edition). Butterworth-Heinemann. ISBN: 978-0-08-096665-6.

Other Required Course Materials:

Engineering Computation Pad
Mechanical Pencils
Graphing Calculator

Course Description & Objectives:

Course Description:

Engineering materials studies the relationship between the microscopic structures and the properties of materials. By understanding these relationships, engineers can understand how to process and select materials for a variety of applications. Students will explore and learn about materials through hands-on lessons and projects.

Course Objectives:

The course is designed to support the *Educational Priorities and Outcomes* of Cornell College. This course primarily emphasizes *knowledge* and *reasoning*. The following show the course objectives and their corresponding educational priority.

- Successfully work in teams and communicate effectively (orally and written).
- Understand core materials science concepts of structure and how they relate to the overall properties of materials.
- Apply materials science core concepts to solve contemporary engineering problems.
- Design a material testing apparatus by applying engineering knowledge within realistic design constraints.

Course Outline:

Class sessions will primarily consist of projects and problem solving. Students will work in both individual and group settings.

Class Topics (subject to change):

- Atomic Bonding & Structure
- Elastic Moduli
- Bonding Between Atoms
- Packing Atoms in Solids
- Young's Modulus
- Strength and Ductility
- Dislocations and Yielding in Crystals
- Strengthening Methods of Materials
- Plastic Flow
- Fast Fracture and Toughness
- Brittle Materials
- Fatigue

Grading

Grading Criteria:

Component	**Percentage**
Attendance	5%
Quizzes	25%
Projects/Homework	40%
Exam	30%

Grading Scale:

A	95-100
A-	90-94
B+	87-89
B	84-86
B-	80-83
C+	77-79

C	74-76
C-	70-73
D+	67-69
D	64-66
D-	60-63
F	<60

Course Requirements & Policies:

Attendance:

As a student you are required to attend all sessions of class. Please inform me of any planned absences at the beginning of the block so we can make arrangements. Attendance will be taken at the beginning of each class session (morning and afternoon). Points will be deducted after the 2nd unexcused absence.

Quizzes:

There will be approximately (3) quizzes throughout the course.

Exams:

There will be one (1) exam during the course. The exam will test both the knowledge of materials and the ability to design using different materials.

Projects:

There will be several small projects throughout the duration of the course. Projects will require teamwork, communication, and design. Furthermore, the team will demonstrate their projects using both written and oral communication.

Homework:

Homework will be periodic throughout the course. Homework is due at the beginning of class. No late homework will be accepted.

Academic Honesty Policy:

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

Students with Disabilities:

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.