University of Minnesota  
Department of Chemical Engineering and Materials Science  
Fall 2015 Syllabus

MWF 11:15-12:05  Molecular and Cell Biology 3-120

Instructors

Primary Instructors
Prof. David J. Flannigan  
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*(Please include MatS 2001 in subject for all emails)

Teaching Assistants: Hours and email contacts posted on Moodle site

Course Description

This 3.0 credit course provides an introduction to the structure-property relationships of engineering materials. We will describe, visualize, and think about the structure of materials, starting with an atomic-level view of bonding and building up to the resulting crystal structures. We will study the relationships between defects, phase diagrams, microstructure, and processing methods and the bulk properties of materials.

Course Goals, Objectives, and Expectations

Students enrolled in this course will:
- Learn the scientific principles underlying the structure of engineering materials, including bonding, crystal structure, defects and microstructure.
- Understand the importance of phase behavior and phase transformation in determining structure.
- Learn fundamental relationships between structure and mechanical properties and performance (failure).
- Learn about processing and manufacturing of engineering materials and the connections between processing and structure.
- Develop an understanding of the different types of engineering materials (metals, ceramics, polymers and composites) in terms of their structure, properties and applications.

It is expected that students will attend lecture, do all the assigned reading, and complete all homework assignments on time.

Course Prerequisites

PHYS 1301W (Introductory Physics for Science and Engineering I)  
MATH 1272 (Calculus II) or MATH 1372 (CSE Calculus II)  
CHEM 1061 (Chemical Principles I)  
CHEM 1065 (Chemical Principles I Laboratory)  
CSE Student

Course Website

Course information and materials along with your grades and class statistics will be provided on Moodle. You can access the course website by logging on through the MyU portal. It is important that you
become familiar with Moodle and check the MATS 2001 website daily for updates, weekly online assignments, messages from instructors and TAs, and other important information.

**Textbooks**

Required: Callister, W. D., Jr.; Rethwisch, D. G. *Materials Science and Engineering: An Introduction*; 9th ed.; John Wiley & Sons, Inc.: New York, 2014. Earlier editions of the text are acceptable. However, reading and homework assignments will be based on the 9th edition; students with an earlier edition are responsible for finding the corresponding assignments.

Companion Website: [http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1118324579&bcsl=8580](http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1118324579&bcsl=8580)

**Clickers and Class Participation Extra Credit**

Clickers will be used for in class responses. The required device is the iClicker2, and it is sold at the campus bookstore. Other courses in CSE and in the ME department may also use clickers and in general the iClicker2 has been uniformly adopted in ME. Be sure to register your clicker on the course Moodle site. For directions to register your clicker go to [http://it.umn.edu/moodle-26-28-register-your-iclicker-in](http://it.umn.edu/moodle-26-28-register-your-iclicker-in). You should bring your clickers to all lectures.

Clicker questions will be based on reading assignments or in class participation. Reading assignment questions will be posted on the moodle site. A correct iClicker response will receive a score of 1.0/1.0. An incorrect response will receive a score of 0.9/1.0. Non-responses will receive 0.0/1.0. The total of iclicker scores for each lecture will be weighted the same, so that a given lecture with more iClicker questions will not count more than a lecture with fewer questions. The lowest 5 lecture (daily) scores will be dropped. The participation extra credit is worth 1% of the total course grade.

**Homework**

Homework will be posted on the Moodle course website on Wednesday after lecture and will be due the following Wednesday at the beginning of lecture in class. You may either bring your homework to class or you can submit your homework online. The due date and time are firm. Homework not turned in at the beginning of lecture will be considered late and will receive a score of zero. To submit your homework online, scan your homework and upload the scanned document (as a single pdf file) using the homework link on the course moodle site. The link will be available until 11:15 am on the homework due date. Scanners are available in all of the CSE labs. **Emailed homework will not be accepted.**

The lowest two homework scores will be dropped. Solutions will be posted on the course website on Moodle within 24 hours after Wednesday's lecture. Each student is required to submit and present their own solutions. **“Copying or paraphrasing from the web, another source, or another student’s solution or permitting your own solution to be copied or paraphrased is considered cheating. The minimum penalty for all students involved is a zero for that homework.”**

**Guidelines for preparing homework**

1. Homework must have your name, homework number, date and page number PRINTED CLEARLY on the front page. (Do not include both your name and student id.) Your name and homework page number must appear on subsequent pages. If submitted in class, staple the entire assignment. Homework must be on standard 8.5 x 11 paper. Other paper sizes, and paper with ragged edges will not be accepted. Follow the ME departmental guidelines for problem sets (see [http://me.umn.edu/education/undergraduate/writing/MESWG-Prob.2.0.pdf](http://me.umn.edu/education/undergraduate/writing/MESWG-Prob.2.0.pdf)).

2. If the assignment requires a plot (not a sketch), use graph paper or data plotting software (e.g., Excel, Origin, MATLAB, etc.). Be sure axes are labeled and include legends as appropriate.

3. Please clearly show and organize your work for numerical solutions. This aids the graders in following your logic and increases the likelihood of receiving all due credit.

4. Use SI units (named units derived from SI units are acceptable; expressing energy in units of electron volts is also acceptable) unless specifically asked to do otherwise in the problem.
5. Homework containing eraser marks will not be accepted for re-grade (see “Re-grading of Exams and Homework” below. To avoid eraser marks on the homework that you submit, here are two options:
   (a) cross through neatly any changes and continue, or (b) submit a photocopy of your homework.

Homework Grading

Within a homework assignment, each problem will be assigned a specific number of points. The total points for the entire homework will be normalized to a scale of 10—such that each homework assignment carries the same weight for the overall course grade.

Examinations

There will be three in-class 50 minute exams. The 2 hour final exam will be given according to the University Schedule. The exams are closed-book and closed-notes. The instructors will provide important tables, figures, and equations for each exam. These “cheat” sheets will be available several days before the exam to help with studying. You are not allowed to have any notes in your possession, on your person, or in your calculator. You may use a scientific calculator (e.g., Casio FX-260). The calculator must not have a text memory, graphing capabilities, or the ability to compute integrals. Examples of unacceptable calculators include the TI-85 and the Casio-9850. If you are uncertain about the suitability of your calculator, please see Profs. Flannigan or Mantell prior to the first exam so an assessment can be made.

Communication devices (e.g., cell phones, etc.) are not permitted during the examination and must remain out of sight in a sealed backpack/bag. No ear buds or ear plugs may be worn during the examination.

No exams may be taken before the scheduled time, and no make-up exams will be given. Missed exams will receive a score of zero. In the case of well-documented family emergencies or illness, special arrangements will be made. Requests for make-up final exams will be considered for cases of well-documented family emergencies and illness.

Makeup Work for Legitimate Absences

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections.

http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html

Re-grading of Exams and Homework

Homework: Once a graded homework has been returned, students have up to one week to request a regrade. No re-grades will be accepted after that time. The request should be made in writing with a cover sheet stapled to the homework, indicating the possible error, and placed in Prof. Flannigan’s mailbox in 151 Amundson Hall. The entire homework will be reviewed by Profs. Flannigan or Mantell for any possible oversight, and the revised grade, which may be higher or lower, will be returned to the student. Homework problems submitted for re-grade having eraser marks will not be accepted.

Exams: Students who wish to have their exams re-graded must submit their request within one week from the date that the exam was returned. No re-grades will be accepted after that time. The request should be made in writing with a cover sheet stapled to the exam, indicating the possible error, and placed in Prof. Flannigan’s mailbox in 151 Amundson Hall. The entire exam will be reviewed by Profs. Flannigan or Mantell for any possible oversight, and the revised grade, which may be higher or lower, will be returned to the student.

**Submitting an altered exam or homework for re-grade is an extremely serious offense and will result in at least a zero for the exam or homework.**
Determination of Grades

Final grades will be assigned from a histogram of the final homework and exam scores, which will be determined from the following weighting:

iClicker: 1% extra credit (5 lowest lectures will be dropped)
Homework: 10% (2 lowest homework scores will be dropped)
Three 50 minute exams: 20% each
Final Exam: 30%

Grad Grade Definitions (http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html):

A Represents achievement that is outstanding relative to the level necessary to meet course requirements
B Represents achievement that is significantly above the level necessary to meet course requirements
C Represents achievement that meets the course requirements in every respect
D Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
F (N) Represents failure (no credit) and signifies that work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see below)

I (Incomplete) The grade of "I" is awarded only in the case of exceptional and verifiable severe illness or tragedy. An "I" will not be awarded because you are doing poorly in the class. Assigned at the discretion of the instructor when, due to extraordinary circumstances (as determined by the instructor), a student that has successfully completed a substantial portion of the course’s work with a passing grade was prevented from completing the work of the course on time; requires a written agreement between the instructor and the student specifying the time and manner in which the student will complete the course requirements

 +/- grades will be assigned within the A, B and C grade ranges.

Statement on Accommodations for Students with Disabilities

It is University policy to provide reasonable accommodations to students with disabilities. This publication is available in alternate formats to persons with disabilities upon request. Please contact the Disability Services office at 612-626-1333, Room 180 of McNamara Alumni Center to arrange a confidential discussion regarding equitable access and reasonable accommodations. If you are registered with Disability Services and have a current letter requesting reasonable accommodations, contact Prof. Flannigan as early in the semester as possible to discuss how the accommodations will be applied in the course.

https://diversity.umn.edu/disability/

Statement on Classroom Conduct

Students are expected to interact with other students and the instructor with courtesy and respect. Students whose behavior is disruptive to other students or to the instructor will be asked to leave. Behavior considered disruptive includes, but is not limited to, talking during lecture, using personal communication devices (talking, texting, emailing, etc.), or any other behavior that results in a deterioration of the learning environment. Students whose behavior suggests the need for counseling or other assistance may be referred to counseling services. As a student at the University, you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see:

Email Policy

In compliance with FERPA and the Minnesota Privacy Act, students must use their University of Minnesota email account for conducting official business with the University of Minnesota. Messages originating from other email addresses will be disregarded.

Statement on Student Academic Integrity and Scholastic Dishonesty

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else’s work as your own can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

Scholastic Dishonesty: Plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, misrepresenting, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

**Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an “F” for the course. If you have any questions regarding the expectations for a specific assignment or exam, please ask.**

Appropriate Student Use of Class Notes and Course Materials

Students may not distribute instructor-provided notes or other course materials, except to other members of the same class or with the express (written) consent of the instructor. Instructors have the right to impose additional restrictions on course materials in accordance with copyright and intellectual property law and policy. Students may not engage in widespread distribution or sale of transcript-like notes or notes that are close to verbatim records of a lecture or presentation.

http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

Statement on Equity, Diversity, Equal Opportunity, and Affirmative Action

The University shall: (1) provide equal access to and opportunity in its programs and facilities without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression; (2) advocate and practice affirmative action consistent with law; (3) establish and nurture an environment for faculty, staff, students, and visitors that actively acknowledges and values equity and diversity free from all forms of prejudice, intolerance, and harassment; (4) provide equal educational access to members of underrepresented groups; and (5) promote and support equity and diversity through its academic programs.

http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf

Statement on Academic Freedom and Responsibility

Academic freedom is the freedom, without institutional discipline or restraint, to discuss all relevant matters in the classroom, to explore all avenues of scholarship, research, and creative expression, and to speak or write on matters of public concern as well as on matters related to professional duties and the functioning of the University.

Mental Health and Stress Management

http://www.mentalhealth.umn.edu/
http://www.mentalhealth.umn.edu/stressmgmt/index.html

Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. Students may be directed to turn off personal electronic devices if the devices are not being used for class purposes. Students are not permitted to record any part of a class/lab/other session unless explicitly granted permission by the instructor. If the student does not comply, the student may be asked to leave the classroom.

Sexual Harassment (http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf)

Sexual harassment shall mean unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature when such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or creating an intimidating, hostile, or offensive work or academic environment in any University activity or program. Such behavior is not acceptable in the University setting.