

CAPILANO UNIVERSITY COURSE OUTLINE	
Term: FALL 2016	Course No. APSC 278
Course: MATERIALS SCIENCE FOR ENGINEERS	Credits: 3.0 Section:
Office: Tel: email:	Instructor:

COURSE FORMAT: Three hours of class time, plus an additional hour of supplemental activity delivered through on-line or other activities for a 15 week semester, which includes two weeks for final exams.

PRE-REQUISITES: CHEM 111, Physics 114 and MATH 116

NOTE: This is an approved Quantitative/Analytical course for baccalaureate degrees.

COURSE OBJECTIVES:

General: A general overview of the processing, structure, properties, and performance of common engineering materials.

Student Learning Outcomes: On completion of the course, the successful student should be able to:

- Describe atomic structure and interatomic bonding
- Demonstrate an understanding of crystal structures and their imperfections and their effect on properties of metals
- Apply Fick's Law of steady-state and non-steady-state diffusion
- Describe and calculate various mechanical properties of metals and their effect on material strength
- Describe one-component phase diagrams
- Demonstrate an understanding of electrochemical corrosion, corrosion rate calculation and corrosion protection
- Describe various polymeric materials and their properties
- Describe various electrical, optical and thermal properties of materials

REQUIRED COURSE MATERIALS:

Textbook: Callister, W.D., Rethwisch, D.G., Materials Science and Engineering, An Introduction, 8th ed., Wiley Publishing, 2010

Additional material: A graphing calculator is required.

COURSE CONTENT:

Topic	Weeks (approx)
Introduction to Materials Science Atomic Structure & Interatomic Bonding	2
The Structure of Crystalline Solids Imperfections in Crystals	2
Diffusion – Fick’s Law (steady-state and non-steady-state)	1
Mechanical Properties of Metals – tensile, hardness, impact, fatigue and material property determination	2
Phase diagrams and development of equilibrium and non-equilibrium microstructures	1
Ceramics - Structures, Properties, Applications and Processing – glasses, abrasives, cements and advanced ceramics	1
Polymers – Structures, Properties, Applications and Processing – polymers, Gaussian chains, entropy , elastomers, rubber elasticity, block copolymers, liquid crystalline polymers	2
Electrical, Thermal, and Optical Properties – electrical and thermal conductivity, band gap theory, semiconductors, thermal expansion, different types of magnetism, superconductivity	2
Final Exam Period	2

EVALUATION PROFILE:

Final grades for the course will be computed based on the following schedule:

Term Tests (2)	45%
Quiz/Homework Questions	10%
Final Examination	35%
Performance Evaluation	10%
TOTAL	100%

PERFORMANCE EVALUATION:

In the absence of exceptional circumstances, which are at the instructor's discretion, the performance evaluation component of the final grade will be prorated to the rest of the grade. For example, a 10% performance evaluation component would be determined by dividing the remaining mark out of 90 by 9. The most common circumstance justifying an increased performance evaluation mark is a student's improved performance in the final examination relative to the midterm exam(s), which the instructor feels justifies an elevated letter grade.

SUPPLEMENTAL 4TH HOUR ACTIVITY:

Supplemental activity might be a scheduled tutorial, an on-line activity, a group meeting, or some other activity as indicated by your instructor.

GRADING PROFILE:

Letter grades will be assigned according to the following guidelines:

A+ 90 - 100%	B+ 77 - 79%	C+ 67 - 69%	D 50 - 59%
A 85 - 89%	B 73 - 76%	C 63 - 66%	F 0 - 49%
A- 80 - 84%	B- 70 - 72%	C- 60 - 62%	

Students should refer to the University Calendar for the effect of the above grades on grade point average.

OPERATIONAL DETAILS:***University Policies:***

Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other education issues. These and other policies are available on the University website.

Attendance:

The student is responsible for all information given in the lectures and laboratories, including times of examinations and assignment deadlines.

Missed Exams:

Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets **all** of the following conditions:

1. Circumstances are beyond the control of the student which resulted in the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do **NOT** include forgetting about the test, lack of preparation for the test, work-related or social obligations.
2. The student has notified the instructor (or the Pure and Applied Science office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification **MUST** occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.
3. Proof of the circumstances must be provided. Proof of illness or injury requires a note from a doctor.
4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. **Fully participating means attending**

almost all classes and turning in almost all assignments in the course.

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Final Exam Period: Students should note that the final exam period is from ?? to ?? (includes Saturday, ??), and that they can expect to write exams at any time during this period. Individual exam times will not normally be rescheduled because of holidays, work, or other commitments. While efforts are made to spread exams throughout the exam period, an individual's particular course combination may result in exams being scheduled close together, or spread widely through the entire exam period.

Cheating/Plagiarism: Students caught cheating on a test will normally receive a grade of "F" on the course and may be expelled from the University. Plagiarism (including the copying of any part of assignments, laboratory reports, and essays) is a serious offence and is a form of cheating.

Incomplete Grades: Incomplete grades ("I") are given only when special arrangements have been agreed upon with the instructor prior to the end of the semester. Since "I" grades are granted only in exceptional circumstances (usually health problems), their occurrence is rare. A student receiving an "I" grade should see the instructor.

English Usage: Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile. Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University bookstore).

Emergency Procedures: Please read the emergency procedures posted on the wall of the classroom.