



A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics and Industrial Processes
Program: Chemical Sciences Technology

CHSC 1103
Engineering Materials 1

Start Date:	September 6, 2006	End Date:	December 15, 2006
Total Hours:	52	Total Weeks:	15
Hours/Week:	3.5	Term/Level:	1
Lecture:	2	Course Credits:	3.5
Lab:	3 hrs/wk alternate weeks	Other:	

Prerequisites

Course No.	Course Name
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CHSC 1103 is a Prerequisite for:

Course No.	Course Name
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CHSC 2203	Engineering Materials 2
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Course Description

This course introduces the mechanical properties of materials and examines the effect of processing on the grain structure and properties of metals. Concepts of materials selection and heat-treatment procedures for carbon steels are also studied.

Evaluation

Midterm Tests	25.0%	Comments:
Lab Reports	20.0%	
In-Class Quizzes, Assignments	15.0%	
Final Exam	40.0%	
TOTAL	100%	

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

1. Describe basic mechanical properties of materials including UTS, Yield Strength, Ductility, Impact Resistance, Tough-to-Brittle Transition Temperature, Elastic Properties, Hardness, Creep Resistance, Fatigue Properties.
2. Select from tables, and/or published data, appropriate mechanical property information and safety factors for materials depending upon the requirements of specific applications.
3. Perform calculations to determine section sizes or bolting requirements for members of simple shape loaded in tension, compression or shear.
4. Explain how the properties of metals are affected by grain structures and processing variables including hot working, cold working, annealing and heat treatment.
5. Utilize the iron-carbon diagram to describe phases in steels and cast irons.
6. Explain the purposes and procedures for various heat treatments of steels (stress relieving, process annealing, normalizing, spheroidizing, quenching and tempering, precipitation hardening, surface hardening).
7. Conduct mechanical property tests on a wide variety of materials using ASTM standard methods. (Tensile, Compression, Shear, Elastic Modulus, Hardness, Fatigue, Impact and Bend Testing).

Verification

I verify that the content of this course outline is current.



Authoring Instructor: Lynn C. Erickson

Sept. 1, 2006

Date

I verify that this course outline has been reviewed.



Program Head: Mark McDonald

Sept 5, 2006

Date

I verify that this course outline complies with BCIT policy.



Associate Dean: Paul Morrison

2006/09/05

Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

Instructor(s)

Lynn C. Erickson	Office No.:	SW1-1415	Office Phone:	604-456-1102
	Office Hrs.:	As posted or by appointment	E-mail Address:	lynn_erickson@bcit.ca

Learning Resources

Required: *Engineering Materials Laboratory Manual* (BCIT)
 Engineering Materials 1 Lecture Notes (BCIT)
 Calculator for Use in Exams: Sharp EL 520W

Suggested: *Engineering Materials, Properties and Selection, 7th Edition* (Budinski & Budinski)

Information for Students

Note: Please refer to BCIT policy number 5002, Student Regulations Policy, for additional information. Policies are available at <http://www.bcit.ca/about/administration/policies.shtml>.

Ethics: BCIT assumes that all students attending the institute will follow a high standard of ethics. Incidents of cheating or plagiarism may, therefore, result in a grade of zero for the assignment, quiz, test, exam or project for all parties involved and/or expulsion from the course.

Assignments: Assignments, lab reports or projects must be done on an individual basis unless otherwise specified by the instructor. Late assignments, lab reports or projects will be devalued 10% per day late to a maximum of 3 days late.

Makeup Tests, Exams or Quizzes: There will be no makeup tests, exams or quizzes. If you miss a test, exam or quiz, you will receive zero marks. Exceptions may be made for documented medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor immediately.

Attendance: The attendance policy as outlined in BCIT Policy 5002 will be enforced. Attendance will be taken at the beginning of each session. Students not present at that time will be recorded as absent.

Illness: If you miss an evaluation such as an assignment, quiz, exam, or project, or you miss 3 or more consecutive days of class, you must provide the department with a BCIT Student Medical Certificate (available at <http://www.bcit.ca/admission/downloads.shtml>). You may be asked to complete the work that you missed or the course evaluation may be adjusted to reflect the missed component(s).

Attempts: Students must successfully complete a course within a maximum of three attempts. Students with two attempts in a single course must get written permission from the Associate Dean to attempt the course for the third time. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the program.

Advancement: Students who fail three or more courses in a term cannot advance to the next term and may be asked to discontinue from the program.

Course Outline Changes: The material or schedule specified in this course outline may be changed by the instructor. If changes are required, they will be announced in class.

Schedule

Week	Starting	Material Covered	Lab Sessions	Assignment Due
1A	Sept. 4	A. MECHANICAL PROPERTIES: Stress, Strain, Units	---	
2B	Sept. 11	UTS, Yield Strength, Ductility, Notch Sensitivity	Lab #1, Tensile Testing 1 Room SW1-1090	
3A	Sept. 18	E (Modulus of Elasticity), Toughness, Transition Temperature	Repeat Lab #1	
4B	Sept. 25	Hardness, Creep, Fatigue	Lab #2, Tensile Testing 2 Room SW1-1090	Lab Report # 1, Due before Lab Time.
5A	Oct. 2	Fracture Appearance, Factor of Safety, Problems	Repeat Lab #2	
6B	Oct. 9	No lecture on Monday BCIT-CLOSED B. METALS: Crystallography, test prep	Lab #3, Charpy Testing Room SW1-1090	Lab Report # 2, Due before Lab Time.
7A	Oct. 16	Grain Structure & Properties Mid-Term #1 (12.5%) Oct. 19	Repeat Lab #3	
8B	Oct. 23	Review, Slip, Annealing	Lab #4, Grain Structures Room SW1-1090 & 1075	Lab Report #3, Due before Lab Time.
9A	Oct. 30	Hot & Cold Working, Forming, Defects	Repeat Lab #4	
10B	Nov. 6	Casting, Powder Metallurgy	Videos Room SW1-1090	Lab Report # 4, Due before Lab Time.
11A	Nov. 13	No lecture on Monday BCIT-CLOSED C. STEELS: Iron-Carbon Diagram, Phases	Lab #5, Quench & Temper Room SW1-1090 & 1075	
12B	Nov. 20	Quench & Temper, Quench Cracks, Hardenability Mid-Term #2 (12.5%) Nov. 23	Repeat Lab #5	
13A	Nov. 27	Review, Softening Processes, Case Hardening	Review	Lab Report # 5, Due before Lab Time.
14B	Dec. 4	Reasons for Alloying, course survey	Review	
15	Dec. 11	FINAL EXAM (40%)	---	

Note: CHSC B Labs are on Week A,
CHSC A, CHSC C Labs are on Week B.