



A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics and Industrial Processes
Program: Mechanical Engineering**CHSC 1105**
Engineering Materials 1**Start Date:** September, 2006**End Date:** December, 2006**Total Hours:** 60 **Total Weeks:** 15**Term/Level:** 1 **Course Credits:** 4**Hours/Week:** 4 **Lecture:** 2 **Lab:** 2**Prerequisites****Course No.** **Course Name****CHSC 1105 is a Prerequisite for:****Course No.** **Course Name**

CHSC 2205 Engineering Materials 2

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. Laboratory sessions emphasize testing and measurement of mechanical properties.

Evaluation

Midterm Test #1	12.5%	Comments:
Midterm Test #2	12.5%	
Lab Reports	25.0%	
Quizzes (Includes pop quizzes)	10.0%	
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. Perform calculations to determine section sizes or bolting requirements for members of simple shape loaded in tension, compression or shear.
3. Explain how the properties of metals are affected by grain structures and processing variables including hot working, cold working, annealing and heat treatment.
4. Utilize the iron-carbon diagram to describe phases in steels and cast irons.
5. Explain the purposes and procedures for heat treatments of steels (stress relieving, process annealing, normalizing, spheroidizing, quenching and tempering, precipitation hardening and surface hardening).
6. 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: Mark McDonald

Sept 4, 2006

Date

I verify that this course outline has been reviewed.

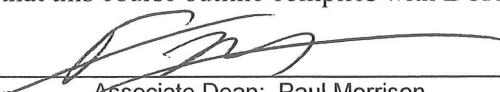


Program Head: Mark McDonald

Sept 4, 2006

Date

I verify that this course outline complies with BCIT policy.



Associate Dean: Paul Morrison

2006/09/08

Date

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

Instructor(s)

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Learning Resources

Required: *Engineering Materials Laboratory Manual* (BCIT)

CHSC 1103/1105 Engineering Materials 1 Lecture Notes (BCIT)

Calculator: Sharp EL-520 WB (Required for tests and final exam)

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 lab 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 of/ Number	Material Covered	Lab Sessions	Assignment Due
Sept. 5	A. MECHANICAL PROPERTIES: Stress, Strain, Units	Lab Orientation	
Sept. 11	UTS, Yield Strength, Ductility, Notch Sensitivity,	Lab #1, Tensile Testing 1 (ALL)	
Sept. 18	E (Modulus of Elasticity), Toughness, Transition Temperature, Hardness	Lab #2, Tensile Testing 2 (First half, plus entire Set F)	Lab Report 1, Due before Lab Time.
Sept. 25	Creep, Fatigue, Fracture Appearance,	Lab #2, Tensile Testing 2 (Second half, except no Set F)	
Oct. 2	Factor of Safety, Problems	Lab #3, Charpy Testing (First half)	Lab Report 2*, Due before Lab Time.
Oct. 9	B. METALS: Crystallography, test prep.	Lab #3, Charpy Testing (Second half)	
Oct. 16	Grain Structure, Slip, Annealing	Midterm Test #1 (ALL)	Lab Report 3*, Due before Lab Time.
Oct. 23	Hot & Cold Working, Forming, Defects,	Midterm Test #1 Review, Videos (ALL)	
Oct. 30	Casting, Powder Metallurgy	Lab #4, Grain Structures (First half)	
Nov. 6	C. STEELS: Iron-Carbon Diagram, Phases	Lab #4, Grain Structures (Second half)	
Nov. 13	Quench & Temper, Quench Cracks, Hardenability	Lab #5, Quench & Temper (First half)	Lab Report 4*, Due before Lab Time.
Nov. 20	Softening Processes, test prep.	Lab #5, Quench & Temper (Second half)	
Nov. 27	Case Hardening,	Midterm Test #2 (ALL)	Lab Report 5*, Due before Lab Time.
Dec. 4	Reasons for Alloying, course survey	Midterm Test 2 Review (ALL)	
Dec. 11	FINAL EXAM WEEK		

*NOTE: Lab Reports 2, 3, 4 and 5 include Supplementary Assignments.