



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	Lecture:	2
		Lab:	3 hrs/wk alternate weeks
			Other:
Prerequisites		CHSC 1103 is a Prerequisite for:	
Course No.	Course Name	Course No.	Course Name
		CHSC 2203	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.

Evaluation

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

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.

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.