ENGG*2120
Material Science - Fall 2008

Professor, Technician and TA Information

Professor: Manju Misra, Associate Professor, School of Engineering and the Department of Plant Agriculture, 215 Thornbrough Building, University of Guelph, Guelph, Ontario, N1G 2W1.

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Office Hours: Every Thursday from 10:00 till 10:45 AM, or by appointment (if you've got a quick question/concern please feel free to send me an email or talk to me before or after class; if you have a question(s)/concern(s) that requires more time, we can set a time to meet that will work for both of our schedules)

Support: Mr. Ken Graham Office: Room 1177, Thornbrough Building, Phone: (519) 824-4120 (Extension 53924), E-Mail: kgraham@uoguelph.ca

Teaching Assistants:

Amanda Farquharson: aportela@uoguelph.ca

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Course and Schedule Information

Course Description: Study of the mechanical, electrical, magnetic, optical and thermal properties of solids. Atomic order and disorder in solids, single-phase metals, and multiphase materials (their equilibria and micro-structure) are examined as a basis for understanding the causes of material properties. Interwoven throughout the course is an introduction to materials selection and design considerations.

Prerequisites: CHEM 1040, PHYS 1130

Class Time: Tues./Thurs. – 8:30-9:50 a.m. Room 102, Maclachlan Building.

Laboratory: Room 1119, Thornbrough Building. Please refer to the Material Science Laboratory Handout for lab procedures and schedule.

ENGG*2120*0101 Material Science M 02:30PM 04:20PM THRN 1119

ENGG*2120*0102 Material Science T 02:30PM 04:20PM THRN 1119

ENGG*2120*0103 Material Science W 02:30PM 04:20PM THRN 1119

ENGG*2120*0104 Material Science M 12:30PM 02:20PM THRN 1119

Text (Required): Callister, W.D. Material Science and Engineering: An Introduction (7th Edition), John Wiley and Sons, Inc., Toronto, 2007 (available for purchase in the bookstore). The online version of the text may also be purchased. If you purchase a hard copy, you also get access to the online text.

Course Website: login to blackboard/CourseLink (formerly WebCT)

Learning Objectives

Upon successful completion of this course, students will be able to:

- Describe the chemical and engineering aspects of materials
- Use typical material properties (particularly mechanical, thermal and electrical ones) to predict the behaviour of engineering components
- Specify the factors involved in manufacturing and using materials

Schedule of Topics

Topic	**Callister 7th Edition Reference Chapters**	**Approx. Date(s)**	**Approx. # of Lectures**
Introduction: Course Outline and Course Expectations		Sept. 4	
Review: the nature of materials and chemical structures	1 and 2	Sept. 9,11	2
Crystalline state and disordered structures	3, 4	Sept. 16,18	2
Mechanical and electrical properties	6 and 18	Sept. 23,25	2
Magnetic and optical properties	20 and 21 (only available online)	Sept. 30,2	2
NX™ FEA introduction (information for your assignment)	John Phillips jphill02@uoguelph.ca	Oct. 7	1
Phase diagrams	9	Oct. 9, 14	2
Thermal properties	11and 19 (chapter 19 is only available online)	Oct. 16	1
Failure	8	Oct. 21	1
MID TERM EXAM OCTOBER 23 8:30AM – 9:50AM (in the class)			
Structure, properties, applications and processing of polymers	14 and 15	Oct. 28, Oct. 30	2
Properties and processing of iron and steel, copper and its alloys, aluminum, nickel, magnesium and titanium	11	Nov. 4,6	2

Properties of ceramics and semiconductors	12, 13, 18	Nov.11	1
Composites	16	Nov. 13	1
Biocomposites and Nano-composites	Lecture note	Nov. 18	1
Materials selection and design considerations	22W (only available online)	Nov. 20	1
Review lecture		Nov 25	1
FINAL EXAM DECEMBER 04 11:30 AM - 1:30 AM (Location TBA)			

***Lectures dates are tentative and examination dates are fixed.**

Marking

Activity	**Percentage of Final Grade**
Laboratory write-ups (4)	20%
UGS NX™ FEA assignment, Due before your scheduled lab time during week 10 (Nov. 6-12)	5%
Midterm Exam -Oct. 23th, 2008 8:30-9:50 a.m. (in the class)	35%
Final Exam – Dec. 4, 2008 11:30 a.m. - 1:30 p.m. (Location TBA)	40%

UGS NX™ FEA assignment tutorial: UGS NX™ FEA assignment tutorial:
One (1.5 hour long) tutorial will be held during **week 6** (Oct. 9th to 15th) to help you with the NX™ FEA assignment. Tutorial times are as follows: 2:30-3:50, 4:00-5:20 pm Tues., Wed. and Thurs., 4:00-5:20 pm Fri. in room 1135 Thornbrough. The tutorials will be run during Engg. 2100 (Design) tutorial times by Engg. 2100 and 2120 teaching assistants. If you are not enrolled in Engg. 2100 but have taken 2100 previously, you will need to attend tutorials in a time slot that will work with your schedule. If you are a transfer student and are currently not enrolled in, or have not taken Engg. 2100, you will need to attend one of the tutorial times listed in each of weeks 1 and 2 in addition to week 6 to help you learn basic NX™ drawing. The FEA assignment is **due** before your scheduled lab time during **week 10** (Nov. 6th to 12th). **You must hand in your assignment to the drop-off cabinet located in the main stairwell of the engineering building (you will be informed of the box number during the lab) before your scheduled lab starts.** Late assignments will not be marked (a mark of zero will be assigned).

Please be aware that there may be questions from material covered in the laboratories, NX™ Tutorials and NX™assignment on both the midterm and final examinations.

Stipulations for passing the course

In order to pass the course, students must pass both the laboratory/FEA assignment and exam course portions. Students must obtain a grade of 50% or higher on the exam portion of the course in order for the laboratory write-up and FEA assignment portions of the course to count towards the final grade. Similarly, students must also obtain a grade of 50% or higher on the laboratory and FEA assignment portions of the course in order for the examination portion of the course to count towards the final grade. Students must attend, complete and write-up all laboratories in order to pass the course. If a laboratory is missed due to illness or other extenuating circumstance for which the student has obtained the required documents according to School of Engineering regulations, students will be allowed to complete and write-up a make-up lab.

Laboratory Experiments

Five laboratory sessions have been scheduled, with students working in groups of 3-4 as follows:

1. Introduction (includes laboratory safety), Measurement Instruments and laboratory sign up
2. Compressive testing of materials
3. Tensile testing of materials
4. Heat treatment of steel
5. Impact testing of materials

Specific instructions for the preparation of laboratory reports are contained in the Material Science Laboratory Manual which should be downloaded from the course website.

General Policies Regarding Laboratories

All labs must be submitted for marking in the assignment drop-off cabinet located in the main stairwell of the engineering building (you will be informed of the box number during the lab) by 12:00 noon one week after the laboratory is performed (labs which are due on Thanksgiving Monday can be handed in on Tuesday October 14th by 12:00 noon). The TA's will be collecting the labs from the drop-off cabinet immediately after the due date time, late labs will not be marked (a mark of zero will be assigned). Marked labs will be handed back to a member of your group during your next scheduled lab session. In order to receive a mark for a lab report you must have contributed to the writing of the lab report and your signature **must** be present on the cover page.

Grading Scale (as per the 2008-2009 University of Guelph Undergraduate Calendar)

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/pdffiles/c08.pdf

Letter Grade	Percent Range
A+	90-100%
A	85-89%
A-	80-84%
B+	77-79%
B	73-76%
B-	70-72%
C+	67-69%
C	63-66%
C-	60-62%
D+	57-59%
D	53-56%
D-	50-52%
F	0-49%

University Policy on Academic Misconduct:

Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar 2007-2008 and School of Engineering programs guide, for offences, penalties and procedures relating to academic misconduct.

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Communications

Communications is through announcements in class. Some information's will be posted on the course website and some will be out through e-mails. Because of the large class enrollment, we usually go through student's messages twice a week. Therefore please do not expect immediate reply to your e-mails.

Disclaimer

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.