

# ENGG\*2120

## Material Science - Fall 2011

### Professor, Technician and TA Information

Professor: Manju Misra, Associate Professor, School of Engineering and the Department of Plant Agriculture, 2413 Thornbrough Building, University of Guelph, Guelph, Ontario, N1G 2W1.

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Office Hours: Every Thursday from 2:00 till 2:45 PM, 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. Barry Verspagen, Mechanical Engineering Technologist, Office: Room 1177, Thornbrough Building, Phone: 519 824-4120 Extension 58821 E-Mail: [baverspa@uoguelph.ca](mailto:baverspa@uoguelph.ca),

### Teaching Assistants:

Name	Office and E mail Ids
1) Brett Harper	128, VMI building, <a href="mailto:harperb@uoguelph.ca">harperb@uoguelph.ca</a>
2) Danielle Boucher	212, Powell building, <a href="mailto:dboucher@uoguelph.ca">dboucher@uoguelph.ca</a>
3) Vidhya Nagarajan	212, Powell building, <a href="mailto:vnagaraj@uoguelph.ca">vnagaraj@uoguelph.ca</a>
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5) Gurvinder Mundi	114, VMI building, <a href="mailto:gmundi@uoguelph.ca">gmundi@uoguelph.ca</a>
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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 and PHYS 1130

Class Time: Tues./Thurs. – 10:00-11:20 AM Room 200, AXEL, Alexander Hall.

Laboratory: Room 1008, Thornbrough Building. Please refer to the 2011 Material Science Laboratory Handout for lab procedures and schedule.

Class Name and Title	Days of Week	Start Time	End Time	Bldg	Room*
ENGG*2120*0101 Material Science	MO	11:30 AM	1:20 PM	THRN	1008/ 1119
ENGG*2120*0102 Material Science	MO	2:30 PM	4:20 PM	THRN	1008/ 1119
ENGG*2120*0103 Material Science	TU	12:30 PM	2:20 PM	THRN	1008/ 1119
ENGG*2120*0104 Material Science	TU	3:30 PM	5:20 PM	THRN	1008/ 1119
ENGG*2120*0105 Material Science	WE	12:30 PM	2:20 PM	THRN	1008/ 1119
ENGG*2120*0106 Material Science	WE	3:30 PM	5:20 PM	THRN	1008/ 1119
ENGG*2120*0107 Material Science	TH	12:30 PM	2:20 PM	THRN	1008/ 1119
ENGG*2120*0108 Material Science	TH	3:30 PM	5:20 PM	THRN	1008/ 1119
ENGG*2120*0109 Material Science	FR	1:30 PM	3:20 PM	THRN	1008/ 1119
ENGG*2120*0110 Material Science	FR	3:30 PM	5:20 PM	THRN	1008/ 1119

\*Lab room locations might be changed during the semester due to the construction related transition; student will be notified ahead of time when it happens.

Text (Required): Callister, W.D. Rethwisch, D.G. Material Science and Engineering: An Introduction (8th Edition), John Wiley and Sons, Inc., Toronto, 2010 (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 CourseLink  
<https://courselink.uouelph.ca>

**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** (\*Lectures dates are tentative and examination dates are fixed).

Topic	Callister 8 <sup>th</sup> Edition Reference Chapters	Approx. Date(s)	Approx. # of Lectures
Introduction: Course Outline and Course Expectations Introduction to Material Science		Sept. 8	1
Review: the nature of materials and chemical structures	1 and 2	Sept. 13, 15	2
Crystalline state and disordered structures	3 and 4	Sept. 20, 22	2

Mechanical	6	Sept. 27, 29	2
Electrical and Magnetic properties	18 and 20	Oct. 4, 6	2
Optical and Thermal properties	21, 11 and 19	Oct. 11,13	2
Phase diagrams	9	Oct.18	1
Structure, properties, applications and processing of polymers	14	Oct. 20	1
Review lecture for the Midterm exam		Oct. 25	1
<b>MIDTERM EXAM OCTOBER 27 10:00AM – 11:20AM (in the class)</b>			
Structure, properties, applications and processing of polymers	15	Nov. 1	1
Properties and processing of iron and steel, copper and its alloys	11	Nov. 3	1
Guest lecture Reflective Paper Assignment	Guest Lecture note	Nov. 8	1
Properties of ceramics and semiconductors	12, 13 and 18	Nov.10, 15	2
Failure	8	Nov. 17	1
Composites	16	Nov. 21	1
Materials selection and design considerations	22	Nov. 24	1
Review lecture for the Final exam		Nov. 29	1
<b>FINAL EXAM DECEMBER 12, 02:30 PM - 4:30 PM (Location TBA)</b> <a href="http://www.uoquelfh.ca/registrar/scheduling/index.cfm?exam_fall">http://www.uoquelfh.ca/registrar/scheduling/index.cfm?exam_fall</a>			

### **Marking**

<b>Activity</b>	<b>Percentage of Final Grade</b>
Laboratory write-ups (4)	20%
Guest lecture Reflective Paper Assignment, due date – on or before Nov. 30 2011, 5:00 PM	5%
Midterm Exam -Oct. 27, 2011 10:00-11:20 AM (in the class)	35%
Final Exam – Dec. 12, 2011 2:30 PM -4:30 PM (Location TBA)	40%

**Assignment:** Fall 2011 ENGG\*2120 GUEST LECTURE Reflective Paper Assignment (5% of final grade) due date Nov.30 2011. **You must hand in your assignment to the drop-off cabinet (#298) located in the engineering alley by the new machine shop 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 materials covered in the laboratories and guest lecture on the final examination.

**Stipulations for passing the course**

*In order to pass the course, students must pass both the laboratory/ 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 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 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 and Assignments**

All labs must be submitted for marking, in the assignment drop-off cabinet (#298) located in the engineering alley by the new machine shop 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 11<sup>th</sup> 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 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 2011-2012 University of Guelph Undergraduate Calendar)**

<http://www.uoguelph.ca/registrar/calendars/guelphhumber/current/pdf/files/calendar.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 2011-2012 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**

Communication 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