

University of Calgary
Department of Chemistry
Course Syllabus
Fall 2018

Course: CHEM 379 - Materials Chemistry for Engineers

CONTACT INFORMATION

LEC	DAY & TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	MWF 1:00 - 1:50	ENC 70	Dr. Amanda Musgrove	SA 144F	amanda.musgrove@ucalgary.ca	TBA

Drop-in office hours will be posted on D2L; appointments may also be requested by email or online via <https://amandamusgrove.youcanbook.me>

You can also ask and answer questions on the class Piazza site:

<https://piazza.com/ucalgary.ca/winter2019/chem379>

To help me reply faster, please put “CHEM 379” in the subject line of any email correspondence.

TEXTBOOK AND COURSE MATERIALS

There is no official textbook for this course. References / bibliography will be provided within each note set for further reading.

You may find some or all of the following resources helpful in your study:

Chemistry: The Molecular Nature of Matter and Change, 2nd Canadian Ed.; Silberberg M, Amateis P, Lavieri S, Venkateswaran R, 2016, McGraw-Hill Ryerson (*this is the CHEM 209 textbook*)

CHEM 209 OER textbook resource (linked on our course D2L)

Organic Chemistry online textbook (for nomenclature, structures):

<http://www.chem.ucalgary.ca/courses/351/Carey5th/Carey.html>

TUTORIALS

Tutorials will run weekly in SA 204 (computer lab). **Topics covered in tutorial are “testable material”** - whether or not they were directly addressed in lectures.

There will generally be a graded activity each week:

- 4 “group weeks” where all activities are completed collaboratively. (2.5% each)
- 4 “individual weeks” where all or most of the activities are completed individually. (5% each)
- The remaining 2-3 tutorial sessions will be dedicated to designing and presenting your *Summary Project*.

Each week, activities may be “open book”, with text, notes, or other resources permitted, or “closed-book” (quiz-style). Check on your activity sheet and with your instructor if you are not sure what resources are allowed for an activity.

A schedule of tutorial activities will be posted to the course D2L site.

COURSE TOPICS

The following topics will be discussed in lectures and/or tutorials, time permitting:

- Nomenclature of organic and inorganic molecules
- Atomic structure and theories of bonding
- Intermolecular forces and their effects on properties of substances
- Crystallinity, molecular crystals, and liquid crystals
- Electronic structure of atoms and molecules
- Molecular sources of color and conductivity
- Structure and Function of Polymers:
 - Polymerization reactions
 - Types of polymers
 - Influence of molecular structure on T_m , T_g , and brittleness/Young's modulus
 - Elastomers and rubbers
 - Colored and conductive polymers
 - LEDs and semiconducting polymers
 - Environmental considerations
- Nano-scale materials
- Bio-mimicry
- Techniques for visualization and testing of materials

TOP HAT

The **in-class Top Hat** practice questions will be graded based on a combination of participation and correctness. If you choose to participate, your average Top Hat score for the semester can *replace your lowest non-zero group-week tutorial score*, if doing so benefits your grade.

This will be done automatically for all students who have participated in Top Hat - make sure your UCID and @ucalgary.ca email are updated in your Top Hat account profile so your grades can be linked.

*All Top Hat grades will be pro-rated to allow for 3-5 classes "free/excused" - if you are ill, unable to attend, or have a tech failure for a couple days, these be covered in the "free" days and balanced out at the end of term. **No need to send in sick notes or notify your instructor for a day or two of TopHat missed during term. If you are unable to participate for longer, contact your instructor to make alternate arrangements.***

(in other words, if we did 100 Top Hat questions in 30 classes (~3 per class) and you scored 75/100, with 4 "free" classes, at the end of term your score would be adjusted to be 75/88. This would be done automatically and posted to D2L after the end of classes).

SUMMARY PROJECT

A Summary Project consisting of an infographic reviewing the properties of a material will be assigned and completed in groups of 2. The project overall (content, presentation, and peer evaluation) is worth 10% of your course grade.

Group assignments, topics, criteria, and presentation schedules will be outlined in tutorial the week of February 11 and posted to D2L thereafter.

TENTATIVE LECTURE & TUTORIAL SCHEDULE

Week Starting:	Schedule for Lecture Topics (Subject to Change)	Tutorial Schedule (Subject to Change - See D2L for topics & updates)
January 10 (<i>Thursday</i>)	Introduction / What is Materials Chem	No tutorial
January 14	Bonding / Shapes	<i>Group Week 1</i>
January 21	Intermolecular Forces	<i>Individual Week 1</i>
January 28	Crystalline Behaviour	<i>Group Week 2</i>
February 4	Polymers and Polymerization	<i>Individual Week 2</i>
February 11	Structure, Stress, and Strain	<i>Intro to Summary Project</i>
February 18 <i>Reading Break</i>	No classes	No tutorial
February 25	Electronic Structure Midterm: Fri Mar 1, in-class	<i>Open study sessions</i>
March 4	Color and Conductivity	<i>Group Week 3</i>
March 11	Color and Conductivity	<i>Individual Week 3</i>
March 18	Materials & Environment	<i>Group Week 4</i>
March 25	Materials & Environment	<i>Individual Week 4</i>
April 1	Nano/Bio	<i>Summary Projects</i>
April 8	Nano/Bio	<i>Summary Projects</i>
<i>Classes End: Apr 12</i>		<i>Final Exam Period: Apr. 15-27</i>