University of Calgary  
Department of Chemistry  
Course Syllabus  
Fall 2018

Course: CHEM 379 - Materials Chemistry for Engineers

**Contact Information**

<table>
<thead>
<tr>
<th>LEC</th>
<th>DAY &amp; TIME</th>
<th>ROOM</th>
<th>INSTRUCTOR</th>
<th>OFFICE</th>
<th>EMAIL</th>
<th>OFFICE HOURS</th>
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</thead>
<tbody>
<tr>
<td>L01</td>
<td>MWF 1:00 - 1:50</td>
<td>ENC 70</td>
<td>Dr. Amanda Musgrove</td>
<td>SA 144F</td>
<td><a href="mailto:amanda.musgrove@ucalgary.ca">amanda.musgrove@ucalgary.ca</a></td>
<td>TBA</td>
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</tbody>
</table>

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

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

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:


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