

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS (CONTENT)
Fall 2015

COURSE: CHEM 209, General Chemistry for Engineers

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	TR	14:00-15:15	SB103	Dr. A. Musgrove-Richer	EEEL 237C	220-7602	amanda.musgroveriche@ucalgary.ca	TBA
L02	TR	12:30-13:45	SB103	Dr. N. Sandblom	SA 144J	210-9816	ntaucoin@ucalgary.ca	TBA
Course Coordinator:				Dr. A. Musgrove-Richer	EEEL 237C	220-7602	amanda.musgroveriche@ucalgary.ca	TBA
Lab / Tutorial Coordinator:				Dr. R. Jackson	SA 144J	220-8274	rjjackso@ucalgary.ca	TBA

TEXTBOOK: Silberberg M, Lavieri S, Venkateswaran R. 2013. Chemistry: The Molecular Nature of Matter and Change. 1st Canadian Ed. McGraw-Hill Ryerson.

TOPICS INCLUDED AND SUGGESTED READING:

Students are responsible for all material included in the lectures, laboratories, and tutorials. Most of the relevant material for these content areas are in the designated sections from the textbook: Chapters 1-4, 6-11, 14-17 and 19.

Note that some material is regarded as review of high school chemistry and will not be addressed in lectures; however, being fundamental to many other topics in chemistry, will certainly be included in tutorials and exams.

Previous background knowledge to be reviewed before the course begins:

Chapter 1: Keys to the Study of Chemistry

Although all sections are included; the focus will be on sections 1.4–1.6.

CHAPTER 2: The Components of Matter

Although all sections are included; the focus will be on sections 2.5–2.9.

CHAPTER 3: Stoichiometry of Formulae and Equations

All sections are included.

CHAPTER 4: Gases and the Kinetic-Molecular Theory

Sections 4.1–4.4.

How fast is a reaction?

CHAPTER 14: Kinetics: Rates And Mechanisms Of Chemical Reactions

All sections 14.1–14.7 are included, but omit the effect of molecular structure on rate (page 571) and biological catalysts (page 583–584).

How far does a reaction proceed?

CHAPTER 15: Equilibrium: The Extent Of Chemical Reactions

All sections are included, but omit Equation 15.4 and 15.5 on page 603.

CHAPTER 16: Acid–Base Equilibria

16.1–16.2 are considered review material.

16.3–16.4 and selected topics within 16.5–16.6 will be included.

CHAPTER 17: Ionic Equilibria in Aqueous Systems

All sections, 17.1–17.4, are included, but omit Selective Precipitation (page 723–724) and Complex Ions of Amphoteric Hydroxides (page 731–732).

CHAPTER 19: Electrochemistry

Section 19.1 should be reviewed before lectures begin on this topic.

Sections 19.2–19.7 will be included, but omit parts of section 19.4 dealing with Gibbs Free Energy and Electrical Work.

What makes a bond?

CHAPTER 6: Quantum Theory and Atomic Structure

Sections 6.1–6.2 should be reviewed before lectures begin on this topic.

Sections 6.3–6.4 are included.

CHAPTER 7: Electron Configuration and Chemical Periodicity

Sections 7.1–7.3 are included with selected topics in 7.4 (ionic size and magnetic properties).

CHAPTER 8: Models of Chemical Bonding

Sections 8.1, 8.3, 8.5–8.6 are included with selected topics in 8.2.

CHAPTER 9: The Shape of Molecules

All sections, 9.1 and 9.2 are included.

CHAPTER 10: Theories of Covalent Bonding

Sections 10.1 and 10.2 are included.

LABORATORY EXPERIMENTS:

1. Determination of the Hardness of Tap Water (*Previous background knowledge*)
2. Kinetics of Fading of Phenolphthalein (*How fast is a reaction?*)
3. Equilibrium Constant for the Formation of $\text{Fe}(\text{SCN})^{2+}$ (*How far does a reaction proceed?*)
4. Visual and Potentiometric Acid-Base Titrations (*How far?*)
5. A Study of Concentration Cells to determine the K_{sp} for Silver Salts (*How far? What makes a bond?*)

CHEMISTRY 209 FALL 2015: LECTURE, LABORATORY, TUTORIAL SCHEDULE

Week Starting Date	Tentative Schedule for Lecture Topics	Lab Schedule	Tutorial Schedule
September 7 <i>NOTE: Monday Sept 7 is Labor Day; B01, B03, and B21 will have orientation on Sept 14 at 9:30 AM.</i>	Introduction How fast are reactions? <i>Chemical Kinetics (Chapter 14)</i>	Orientation for odd-numbered lab sections <i>*see note</i>	No Tutorial. <i>** Look ahead as next week's tutorial quiz will require reviewing a lot of material. **</i>
September 14	How fast are reactions? <i>Chapter 14 Suggested problems: 12, 15, 18, 20, 34 & 35</i>	Orientation for even-numbered lab sections	Quiz # 1 Stoichiometry & Review Material (Chapters 1 – 3) <i>Suggested problems for review:</i> Chapter 1: 19, 27, 34, 45, 52, 54, 70. Chapter 2: 39, 43, 57, 70, 102, 108. Chapter 3: 12, 25, 56, 66, 67, 86, 89, 112, 140.
September 21	How fast are reactions? <i>Chapter 14 Suggested problems: 43, 44, 45, 59, 61, 72, 76, 77, 82, 83, 121,125</i>	Experiment 1 for odd-numbered lab sections	Quiz # 2 Gases (Chapter 4) & 1 st topics in Chemical Kinetics (Chapter 14.1–14.3) <i>Suggested problems for review:</i> Chapter 4: 24, 26, 33, 38, 47, 59, 104
September 28	How far does a reaction proceed? <i>Chemical Equilibrium (Chapter 15) Suggested problems: 15, 19, 28, 29, 35, 42, 45, 51, 59, 63, 76, 82, 83, 87, 105, 109</i>	Experiment 1 for even-numbered lab sections	Quiz # 3 Final topics in Chemical Kinetics (Chapter 14.4-14.7)
October 5	How far does a reaction proceed? <i>Chemical Equilibrium: Acids & Bases (Chapter 16) Suggested problems: 18, 24, 35, 37, 44, 50, 56, 58, 69, 75, 81, 92, 97, 102</i>	Experiment 2 for odd-numbered lab sections	Review tutorial
October 12 <i>NOTE: Monday October 12th is Thanksgiving B02 & B04 will perform Expt 2 on Thursday, October 15th at 19:00.</i>	How far does a reaction proceed? <i>Chemical Equilibrium: Buffers & Solubility (Chapter 17) Suggested problems: 6, 16, 19, 28, 32, 37, 45, 52, 59, 61, 78, 85, 89, 110, 111, 116, 119, 159.</i>	Experiment 2 for even-numbered lab sections <i>*see note</i>	No tutorials <i>NOTE: Midterm Exam is Tuesday October 13th from 19:00-21:00.</i>

Week Starting Date	Planned Schedule for Lecture Topics	Lab Schedule	Tutorial Schedule
October 19	How far does a reaction proceed? <i>Chemical Equilibrium: Buffers & Solubility (Chapter 17)</i>	Experiment 3 for odd-numbered lab sections	Quiz # 4 Acids & Bases (Chapter 16)
October 26	How far does a reaction proceed? <i>Electrochemistry (Chapter 19)</i>	Experiment 3 for even-numbered lab sections	Quiz # 5 Buffers (Chapter 17)
November 2	How far does a reaction proceed? <i>Electrochemistry (Chapter 19) Suggested Problems: 10, 12, 14, 21, 27, 30, 38, 42, 51, 70, 81, 87, 101, 105, 109, 154</i>	Experiment 4 for odd-numbered lab sections	Quiz # 6 Solubility (Chapter 17)
November 9	What makes a bond? <i>Atomic Structure (Chapter 6) Suggested Problems: 7, 16, 48, 51, 53, 59, 75, 92</i>	Reading Days. No labs.	Reading Days. No tutorials.
November 16	What makes a bond? <i>Electron Configuration (Chapter 7) Suggested Problems: 6, 13, 21, 23, 29, 37, 50, 53, 59, 77, 79, 83</i>	Experiment 4 for even-numbered lab sections	Quiz # 7 Electrochemistry (Chapter 19)
November 23	What makes a bond? <i>Models of Chemical Bonding (Chapter 8) Suggested Problems: 10, 17, 39, 58, 60, 64, 69, 71, 73, 79, 89.</i>	Experiment 5 for odd-numbered lab sections	Quiz # 8 Atomic Structure (Chapter 6) & Electronic Configuration (Chapter 7)
November 30	What makes a bond? <i>The Shapes of Molecules (Chapter 9) Suggested Problems: 6, 8, 14, 16, 20, 25, 31, 45, 46, 47</i>	Experiment 5 for even-numbered lab sections	Review tutorial
December 7	What makes a bond? <i>Theories of Covalent Bonding (Chapter 10) Suggested Problems: 1, 7, 13, 20, 40 (a & b only), 44</i>	No labs.	No tutorials

Department Approval: Approved by Department Head

Date: August 20, 2015