CHEMISTRY 150: Structure & Properties — Fall 2018 (Tentative Syllabus)

Section 3: http://canvas.emory.edu/courses/46861
Section 4: http://canvas.emory.edu/courses/46862

PROFESSOR: Dr. Austin Scharf (austin.scharf@emory.edu)

SI LEADER: Maggie Gunter (maggie.gunter@emory.edu)

SCHEDULE:

Section 3: Mondays, Wednesdays, & Fridays, 10:00-10:50 am, OSB 417.
Section 4: Mondays, Wednesdays, & Fridays, 11:00-11:50 am, OSB 417.

OFFICE HOURS: Held in OSB 206.

Mondays, 2:00-4:00 pm, Fridays 1:00-2:00 pm, *and by appointment*.

COURSE MATERIALS:

Required:
Chemistry: Atoms First, 3rd ed. Burdge & Overby (electronic book recommended)
Organic Chemistry, 10th ed. Carey & Giuliano (electronic book recommended)
McGraw-Hill *CONNECT* access (accompanies the Burdge & Overby e-textbook)
ALEKS Registration Code for Scharf sections
Scientific calculator; TI-30Xa or TI-30X II preferred (others subject to instructor approval)
Molecular Visions Model Kit

Recommended: Solutions manuals for both textbooks. (These are also available on reserve in the library.)

OVERVIEW:

Chemistry 150 is the first in a series of integrated chemistry courses designed to familiarize students with the fundamental principles of the discipline. This course focuses on the structure of matter, from the subatomic to the macroscopic scale, and develops an understanding of how the *structure* of matter is directly related to the chemical and physical *properties* of matter.

BACKGROUND/PREREQUISITES:

While there are no formal class prerequisites for Chem 150, it is helpful if enrolled students have completed one year of high school chemistry or the equivalent. Before enrolling in Chem 150, students must complete the Oxford College Chemistry Placement (OCCP) module, an online learning tool integrated into the artificial intelligence platform called ALEKS. Instructions for completion of the OCCP have been sent to all students under separate cover.

LEARNING OBJECTIVES:

This course aims to provide a basic foundation for further study in chemistry, and provide some important foundational concepts that are relevant in understanding the role of chemistry in other disciplines. Each topic is covered with textbook reading, suggested problems, required online tutorials and/or homework (ALEKS, *CONNECT*, and LearnSmart), supplemental resources like videos and external readings, lecture, and group-based work. The *goals* of these assignments – that is, the **learning objectives** for each topic – are explicitly laid out on Canvas. Please read them each day of class and use them as guides for your studies.

COURSE COMPONENTS:

Lecture: Thrice-weekly lectures will emphasize the concepts & skills necessary for students to understand and explain chemical behavior. Lectures will involve some presentation from the instructor, as well as interactive and group work. As such, students are expected to:

- *prepare* for each lecture by completing all assigned reading and homework;
- *participate* in all activities during lecture; and
- *engage* in inquiry within the classroom, by asking and answering questions of the instructor and peers.

You are expected to bring a writing utensil, a calculator, and a device on which to access the textbook to each lecture.

Outside of Lecture: Chemistry is a challenging topic that requires regular engagement with the course content *outside* of assigned class times. Students are expected to complete modules in the online platform ALEKS on a weekly basis (details provided in a separate document); content covered in ALEKS ***may or may not*** duplicate material covered in lecture, but students are responsible for all material covered in *either* lecture *or* ALEKS. In addition to online modules, there will be regular assignments (graded and ungraded) posted on the course Canvas website.

Laboratory: The laboratory course Chem 150L is a ***corequisite*** with Chem 150; details of the laboratory course are provided separately.

ASSIGNMENTS & GRADES:

Attendance & Participation: Students are expected to attend all scheduled course meetings. Excessive absences will be noted and *will* affect the course grade. For each absence after the 3rd, 1% will be deducted from the final course grade. (E.g. a student who has 6 absences will lose 3% of their overall course grade.) Tardies (arrival >5 minutes late to class) or behavioral citations may count as absences if they are persistent or severe, as judged by the instructor.

In-class assignments: Quizzes and other in-class assignments will be administered regularly throughout the term. No make-up in-class assignments will be given. The equivalent of one quiz grade will be dropped at the end of the semester.

Out-of-class assignments: Several out-of-class assignments will be required throughout the term. These may be in the form of worksheets, problems from the textbook, or online assignments housed on Canvas or the McGraw-Hill platform *CONNECT*. Whether an assignment will be graded or ungraded *will not be announced* until the due date.

ALEKS: Throughout the term, students are expected to complete online modules through the artificial intelligence platform known as ALEKS. The platform records dates and times of completion; each assignment ***must be completed in its entirety by the due date & time to count for credit***.

In-class examinations:

Four in-class exams are scheduled during regular lecture periods. *No make-up examinations will be administered.* Excused absences from examinations must be presented **before** the scheduled exam – these may be presented by email or in person. If the excuse is acceptable, the grade for that exam will be replaced by the final exam grade. If an excuse is not acceptable, a zero will be given for the exam. Only one excused absence can be granted for the entire semester. The anticipated schedule of in-class examinations is as follows:

Exam	Anticipated Date
1	Friday, Sept. 21
2	Monday, Oct. 15
3	Monday, Nov. 12
4	Friday, Dec. 7

The schedule of in-class examinations is *tentative*, and may change as necessary.

Final examination:

A cumulative, 3-hour final examination will be given during Exams Period. All content covered in lecture, assigned textbook reading, ALEKS, or other assignments is "fair game" for the final exam. The final examination is *mandatory*; students who do not attend the final examination will be awarded an **Incomplete** for the course. The final exams for each section will be:

Section 3 (10 am): *Wednesday, Dec. 19, 2:00-5:00pm*
Section 4 (11 am): *Tuesday, Dec. 18, 2:00-5:00pm*

LearnSmart: Occasionally, opportunities will arise for students to complete *optional* assignments in the e-textbook platform *LearnSmart*; these assignments will provide additional practice with problem-solving. Completion of these assignments in *LearnSmart* can earn a student up to 1% of the overall course grade as a bonus.

OVERALL GRADES:
This course is **not graded on a curve**; students will never be in competition with classmates for a grade. Letter grades will be assigned using the following cutoffs:

	93		90		87		83		80		77		73		70		67		60	
A	|	A-	|	B+	|	B	|	B-	|	C+	|	C	|	C-	|	D+	|	D	|	F

Category	Portion of Overall Grade
In-Class Assignments	4%
Out-of-Class Assignments (CONNECT)	4%
ALEKS Objectives	3%
ALEKS Final Assessment	3%
In-Class Examinations	64% (16% each)
Final Exam	22%
LearnSmart (Bonus)	*1%*
TOTAL:	101%

ACADEMIC INTEGRITY:
All students are expected to adhere to the Oxford College Honor Code. Any behaviors that are deceitful, dishonest, unfair, or otherwise show a lack of academic integrity are not acceptable. College students are adults, and must conduct themselves in a professional, respectful, and responsible manner. The goal of pursuing a collegiate education is *to learn*, and one of the primary goals of the Honor Code is to ensure an environment where *learning* is paramount. Behaviors that undermine that environment are not conducive to the liberal arts education.

Examples of behaviors that may constitute violations of the Honor Code:

- Using resources that are not allowed during an examination (programmable calculators, cell phones, etc)
- Collaborating with peers on assignments in which collaboration has not been expressly permitted
- Providing deceitful excuses to miss class or examinations
- Manipulating a tutor into providing answers for assignments
- Allowing someone else to complete online assignments or ALEKS modules
- Providing any course content to an outside vendor or student, such as an external tutor

(though working with a tutor is encouraged, you are not permitted to *give* the tutor any course materials to take away from a tutoring session.)

This list is *not exhaustive,* and other actions may constitute violations. If ever in doubt about the academic integrity policy, please ask the instructor.

ACCESSIBILITY SERVICES:
Oxford College is committed to providing an accessible academic community. The Office of Accessibility Services (OAS) offers a variety of accommodations and services to students with documented disabilities. Please email oas_oxford@emory.edu or call (770) 784-4667 to discuss appropriate accommodations with the OAS *as soon as possible*. Failure to contact the OAS and obtain an official Notice of Accommodation will result in *no accommodations granted*. The Notice must be presented to the instructor well in advance of any required accommodations, so that appropriate arrangements may be made.

MISCELLANEOUS COURSE POLICIES:
Regrades: Assignments and examinations will only be considered for regrades in the case of *mathematical errors* or *gross inconsistencies* on the part of the grader. Regrade requests must be submitted **in writing** within 3 days of receipt of the graded assignment. A Regrade Request Form is available on Canvas.

Quiz & Exam Keys: Keys to most assignments will be posted on Canvas shortly after the assignment is due. A ***critical*** part of the learning process is evaluating your own assignment in relation to the key, and *learning from your discrepancies and mistakes*.

Behavior: Disruptive, disrespectful, or otherwise unprofessional behavior is unacceptable. Students are held to the standards of any other adult in a professional, working environment. If you have questions about what constitutes unacceptable behavior, please ask the instructor.

TENTATIVE CLASS SCHEDULE:

We will most likely follow the following schedule. **Please read the assigned chapter(s) BEFORE each class period.** ("B" indicates the Burdge text; "C" indicates the Carey text.)

Date	Topic	Reading
29-Aug, W	Introduction; course policies; syllabus	
Module 1: *Foundations of Chemistry* (Burdge, Chapters 1-2)		
31-Aug, F	Units, scale, and the mole	B 1.2-1.4
3-Sep, M	***Labor Day, no classes***	
5-Sep, W	Units, scale, and the mole (cont.)	B 2.7
7-Sep, F	Mass spectrometry & scientific explanations	B 2.3, 2.5-2.7
Module 2: *Elementary Quantum Mechanics* (Burdge, Chapter 3; Carey, Section 1.1)		
10-Sep, M	Waves and particles	B 3.1-3.3
12-Sep, W	Atomic emission & the Bohr model	B 3.4
14-Sep, F	The quantum mechanical model of the atom	B 3.5-3.7
17-Sep, M	Atomic orbitals	B 3.8, C 1.1
19-Sep, W	Introduction to electron configurations	B 3.9-3.10
21-Sep, F	**Exam 1**	
Module 3: *Periodic Trends & Properties* (Burdge, Chapter 4)		
24-Sep, M	Energy, forces, & Coulomb's Law	B 3.1, 4.3
26-Sep, W	Atomic & ionic radii	B 4.3-4.6
28-Sep, F	Ionization energies	B 4.3-4.6
Module 4: *Bonding* (Burdge, Chapters 5, 6, and 7)		
1-Oct, M	Ionic bonding & lattice energy	B 5.3-5.4
3-Oct, W	Covalent bonding & potential energy	B 5.5
5-Oct, F	Molecular orbital theory of diatomic molecules	B 7.7
8-Oct, M	***Fall Break, no classes***	
10-Oct, W	Lewis structures	B 6.1, 6.3-6.4
12-Oct, F	Lewis structures (cont.)	B 6.1, 6.3-6.4
15-Oct, M	**Exam 2**	
Module 5: *Models & Three-Dimensional Representations* (Burdge Chapter 5; Carey, Sections 1.3, 1.7, 1.9)		
17-Oct, W	Molecular shape & VSEPR Theory	B 7.1
19-Oct, F	Molecular shape (cont.)	C 1.9
22-Oct, M	Valence bond theory & hybridization	B 7.4-7.6
24-Oct, W	Valence bond theory & hybridization (cont.)	B 7.6-7.7, C 1.3
26-Oct, F	Resonance	B 7.8
29-Oct, M	Resonance (cont.)	C 1.7

Module 6: *Diving Deeper into 3-D Structure* (Burdge, Chapters 22-23; Carey Chapters 1-4, subsections)

31-Oct, W	Bond-line representations; functional groups	B 23.1-23.3, C 2.19
2-Nov, F	Nomenclature of organic compounds	C 2.14, 2.17-18
5-Nov, M	Constitutional isomers	B 23.4, C 2.11-13
7-Nov, W	Newman projections & conformational analysis	C 3.1-3.3
9-Nov, F	Conformational analysis of cyclic systems	C 3.4-3.10
12-Nov, M	**Exam 3**	
14-Nov, W	Configurational isomers	B 23.4, C 4.1
16-Nov, F	Chirality, symmetry, & stereochemistry	C 4.2-4.6
19-Nov, M	Stereochemistry & stereogenic centers (cont.)	
21-Nov, W	***Thanksgiving Break, no classes***	
23-Nov, F	***Thanksgiving Break, no classes***	

Module 7: *Connecting Molecular Structure & Properties* (Burdge, Chapter 7; Carey, Sections 1.4, 1.10, 2.21, 5.6)

26-Nov, M	Electronegativity & polarity	B 7.2 C 1.4, 1.10
28-Nov, W	Intermolecular interactions/forces	B 7.3, 2.21
30-Nov, F	Intermolecular interactions/forces (cont.)	C 5.6
3-Dec, M	Unit cells	B 12.3-12.4
5-Dec, W	*Catch-up and Q&A*	
7-Dec, F	**Exam 4**	
10-Dec, M	*Final day of classes; Review for final exam*	
18-Dec, Tu	Final Exam, 11am section (2:00-5:00pm)	
19-Dec, W	Final Exam, 10am section (2:00-5:00pm)	

A FINAL NOTE:
You may fear that chemistry is one of the most boring and difficult courses in the science curriculum. We hope to prove you wrong! We hope that you'll emerge from this course as excited about chemistry as we are. Whether your future involves medicine, science, art, or anything else, you'll find that chemistry is everywhere around you. You will see the world differently after taking this course.