30 January 2019

CHEM 144: Principles of Chemistry II

Course Syllabus
2019 Spring Semester

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Lectures: Monday, Wednesday, Friday 8:50-9:40 am, SCIE 58

Office hours: Mondays 2:30-4:00 pm in HA 135 and Tuesdays 2:00-3:30 pm in the STEM Zone (SciLi) or by appointment.

You may also stop by my office or lab outside my office hours if I'm there, but it is possible that at times I may not be able to meet with you due to other responsibilities that demand my attention.

Contact policies: The best way to contact me (other than coming to office hours) is by email. I will try to answer your email within a few hours, however, it may take up to 24 hours (48 hours on weekends) depending on my schedule. This way I can be sure to provide you with an adequate response. If you email after 6 pm, I will not get to your email until the next day.

Prerequisite: CHEM 143 is the formal prerequisite for CHEM 144. Students with equivalent previous coursework will be granted prerequisite overrides, but mastery of the material covered in CHEM 143 will be assumed.

Textbooks:

(1) Oxtoby, Gillis, and Campion *Principles of Modern Chemistry* (6^{th} or 7^{th} edition)
(2) Wulfsberg *Principles of Descriptive Inorganic Chemistry*

Both textbooks are required and are available on reserve in the Science Library.

Discussion Sections:

Mondays 4:25-5:55 pm, SCIE 137 or HA 53	Tuesdays 4:25-5:55 pm, HA 52
Mondays 7:10-8:40 pm, SCIE 139 or 141	Tuesdays 7:10-8:40 pm, SCIE 139

Attendance at your assigned discussion section is **mandatory** and will be recorded.

Optional drop-in TA help session: Tuesdays 8-9:30 pm, SCIE 92

Course TAs:

Important Dates:

- Feb. 6—End of Drop/Add Period
- Mar. 11-24—Spring Break
- May 1—Last Day to Withdraw
- May 8—Last Day of Classes

The registrar-scheduled **final exam is on Tuesday, May 14th from 9 am-noon**. It will not be possible to administer the exam prior to this time. Please plan your travel accordingly.

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Course Summary:

CHEM 144 is focused on understanding structure and bonding in molecules, and on using these fundamental concepts to predict reactivity. In particular, it provides an introduction to topics in inorganic chemistry, quantum mechanics, and kinetics.

Graded Assignments:

Homework
Homework will consist of two parts: (1) weekly problem sets and (2) problems from discussion sections.

The **problem sets** will be assigned each Wednesday and are typically due the following Wednesday at noon. You are allowed (and encouraged) to work on the problem sets together, though plagiarism is strictly forbidden. Discussion sections provide time for collaborative work on problem sets after completion of the discussion section problems (below).

The **discussion section problems** will be handed out at the beginning of each discussion section. Students will then split into groups and each group will work on one (or more) of the problems. Once all groups have solved their problem(s) they will each present their solution to the rest of the discussion section. A primary goal of discussion section questions is to help prepare you to answer questions "on the fly," just as you will need to do during exams. The purpose of presenting solutions to the group is to share problem solving strategies and learn new successful approaches from your classmates.

Homework may be turned in during class or to the in-box outside HA 135. When turning in homework you need to have **both** the problem set **and** your discussion section problem(s). Homework that only includes the problem set or only the discussion section problems will be considered incomplete and *cannot receive full credit*. **Late homework will be penalized 10% per day**, unless arrangements have been made *in advance* with Prof. Personick.

Exams
There will be three 50 minute exams over the course of the semester as well as a final exam. The exams will be in class and written to be doable within the class period. All exams will be closed note, closed book. You may use a calculator, scientific or otherwise, though it will generally not be necessary. *There will be no make-up exams*. If an in-class exam is missed, the weight of the final exam in the total score will be increased by 100 points.

Exam appeals/re-grades: I want to be sure every student receives credit for all correct work done on their exams. If you believe an error was made in the grading of your exam then please bring the exam to me *within 1 week of when it was returned*. Provide a short (few sentences at most) description of what you believe was marked incorrectly, and let me know how much credit you believe you should have received on the problem in question. I'll then go over it and have it back to you within a week.

Badges

Badges are self-paced expertise-building exercises. Two badge opportunities will be provided during the semester and both must be completed to receive full credit.

Grading:

8 Homework Sets (60 points each)	**=**	**480 pts**
3 In-Class Exams (100 points each)	**=**	**300 pts**
Cumulative Final Exam (150 points)	**=**	**150 pts**
ACS Foundational Inorganic Exam (20 points)	=	**20 pts**
Badges (25 points each)	**=**	**50 pts**
Total	**=**	**1000 pts**

CHEM 144 is not graded on a curve, so you are not competing with anyone else for your grade. Letter grades will be assigned according to the percentages defined by the university for GPA calculations: http://www.wesleyan.edu/registrar/general_information/GPA_calculation.html.

Students with Disabilities:

Wesleyan University is committed to ensuring that all qualified students with disabilities are afforded an equal opportunity to participate in, and benefit from, its programs and services. To receive accommodations, a student must have a disability as defined by the ADA. Since accommodations may require early planning and generally are not provided retroactively, please contact Accessibility Services as soon as possible.

If you believe that you need accommodations for a disability, please contact Accessibility Services, located in North College, rooms 021/022, or call 860-685-5581 to arrange an appointment to discuss your needs and the process for requesting accommodations. Once you have met with Accessibility Services, please meet with me as soon as possible, and *no later than the 3rd full week of classes,* so that we can make appropriate arrangements.

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Tentative Lecture Schedule:

Lectures will be based off material from the Oxtoby, Gillis & Campion and Wulfsberg textbooks, however, the lectures won't just be a direct repetition of the textbooks. Graded assignments (homework and exams) will reflect the material we cover in class, since the lectures will focus on what I believe are the most important concepts for CHEM 144. Therefore, it's important that you attend lectures. I have listed the specific sections of the textbooks that are most relevant to each lecture, as keeping up with the readings as well as the lectures and homework will help you to fully master the material.

Note:

This is a "tentative" lecture schedule because we may get ahead and we may fall behind at times. However, I plan to follow this schedule as closely as possible.

Date	Topic	Wulfsberg	Oxtoby, Gillis, & Campion
Jan. 25	Introduction and Overview	1.1-1.2	
Jan. 28	Weak Intermolecular Forces		10.3
Jan. 30	Hydration and Hydrolysis of Cations	2.1-2.5	
Feb. 1	Oxo Acids and Oxo Anions	2.6-2.8, 2.11-2.12	
Feb. 4	Precipitation and Ionic Bonding	3.6-3.7	16.1-16.2, 21.5
Feb. 6	Solubility Rules	3.1-3.5, 3.8	
Feb. 8	Acid-Base Concepts in Reactivity		
Feb. 11	The Hard-Soft Acid-Base Principle	8.1-8.6	8.1 (p. 353-355)
Feb. 13	The Hard-Soft Acid-Base Principle (cont.)		
Feb. 15	Applications of HSAB	8.9-8.10	
Feb. 18	Question Day		
Feb. 20	**In-Class Exam 1**	**Content from Jan. 25 – Feb. 15**	
Feb. 22	Introduction to Kinetics		18.1
Feb. 25	Rate Laws		18.2
Feb. 27	Kinetics and Mechanism		18.3-18.5
Mar. 1	Catalysis		18.8
Mar. 4	Reversible Rates and Equilibrium		
Mar. 6	Applications of Kinetics		
Mar. 8	Modern Electronic Structure		4.1-4.2
Mar. 25	The Bohr Model of Hydrogen		4.3
Mar. 27	Quantum Mechanics of Hydrogen		4.4-4.5
Mar. 29	One-Electron Atoms		5.1
Apr. 1	One-Electron Atoms (cont.)		
Apr. 3	Question Day		
Apr. 5	**In-Class Exam 2**	**Content from Feb. 22 – Apr. 1**	

Apr. 8	Multi-Electron Atoms	11.1-11.6	5.2-5.5
Apr. 10	Multi-Electron Atoms (cont.)		
Apr. 12	Homonuclear Diatomic Molecules		6.1-6.5
Apr. 15	Heteronuclear Diatomic Molecules		6.6-6.7
Apr. 17	Valence Bond Theory and Hybridization		6.8-6.12
Apr. 19	Applications of Valence Bond Theory		7.3-7.5
Apr. 22	Valence Bond Theory vs. MO Theory		
Apr. 24	Structure and Properties of Coordination Complexes		8.2-8.3
Apr. 26	Crystal Field Theory		8.4-8.5
Apr. 29	Applications of Coordination Complexes		
May 1	Question Day		
May 3	**In-Class Exam 3**	**Content from Apr. 8 – Apr. 29**	
May 6	ACS Foundational Inorganic Exam		
May 8	Semiconductors and Quantum Dots		p. 1093-1095
May 14	**Final Exam 9 AM – noon**	**Cumulative up to Apr. 29**	