Syllabus

Chemistry 115 (Weisshaar)

Fall Semester, 2016

Chemistry 115 is the 5-credit, first course of a two-semester honors sequence focusing on fundamental chemical principles. It is designed for very well prepared and highly motivated students with a strong interest in science or engineering. The course is quite mathematical, and presumes a sound background in chemistry, physics, and calculus. We will explore a detailed atomic and molecular view of matter and its interactions. Topics include quantum theory, molecular structure and bonding, kinetic theory of gases, and descriptions of liquids, solids, and phase transitions. Chemistry 116, the second course of the sequence, treats thermodynamics, chemical and physical equilibrium, electrochemistry, acid-base chemistry, solubility, chemical kinetics, and spectroscopy.

Instructor: James C. Weisshaar, 4211 Chemistry, 262-0266, *weisshaar@chem.wisc.edu*.

Lab Director*:* Dr. Pamela Doolittle, 2303a Chemistry, 262-9679, *pam@chem.wisc.edu*.

Weisshaar Office Hour: Thursday afternoon, details TBA, 4211 Chem (middle building). Or by appointment. Or just drop by.

Teaching Assistant: Ms. Tesia Janicki, *tjanicki@wisc.edu*. 1201 Chemistry, desk #20. Office hour: Friday afternoon, details TBA.

Primary Text: D.W. Oxtoby, H.P. Gillis, and A. Campion, Principles of Modern Chemistry, 6th edition, Thomson Brooks/Cole, 2008. (This can be found online as a .pdf download.)

Other Required Materials: (1) Lab notebook (on sale in Chemistry lobby first week of classes). (2) Industrial quality safety goggles for lab work (purchased at bookstore). (3) A scientific calculator. If you have a smartphone, there is likely an app!

Lectures: MWF 8:50-9:40 am, 2311 Chemistry. *The lectures and discussion sections are an integral part of the class.* Attendance is essential! You should take your own notes. To a first approximation, we will follow Chapters 1-10 and 21 in the text, but at a higher level.

Web Page: *Learn@UW* has a Chem 115 site where I will post problem sets, exam and problem set answer keys, reading assignments, etc. You can log in at: *https://learnuw.wisc.edu/*. Click the tab marked "D2L: Chem 115" to get into the course.

Problem Sets: Weekly, usually assigned Monday and due the following Monday before class. *Late papers will not be accepted!!!* Show your work! Solutions will be posted on *Learn@UW*. *We encourage you to discuss the problems together, but you must hand in and take responsibility for your own solutions.* And you will take the exams alone!

Discussion Section: These are devoted to review of recent lecture material and problem solving. Your TA Tesia is in charge of content.

Examinations: Three in-class exams during the semester. *Likely dates*: Friday, October 14, Wednesday, November 16, and Wednesday, December 14. *Final exam:* Tuesday, December 20, 7:45 am – 9:45 am. The exams will focus on the lecture material, but questions about the labs are possible. No make-up exams will be given. The final exam will be comprehensive.

Literature Research Topic and Oral Presentation: A research paper is due at the beginning of class on Monday, November 21. The paper should be 8-10 pages long (about 2500 words) and should describe a modern research topic related to the Chem 115 course material (broadly defined). Please include the relevant citations. You should begin looking for a topic that interests you. Your topic needs the professor's approval on or before Friday, October 28. You will also give a short oral Powerpoint presentation briefly summarizing your topic in the lab sections during the week of December 5.

Grading: Problems sets (100 points), Exam I (100), Exam II (100), Exam III (100), Final Exam (200), Research paper (100), oral presentation (100), Laboratory (200). Course grades based on the class distribution of total points; no absolute grading scale.

Math comment: All of you have had some calculus, but many of you have not seen multi-variable calculus. We will learn the math as we need it.

Questions: Please feel free to interrupt the lecture to ask questions. It helps me to sharpen my thinking and to better understand how things are going "out there".

Laboratory**:** Laboratories meet on Wednesday afternoons and Thursday mornings in Room 2365 (see the schedule that follows). In all laboratory periods in which you work with chemicals you are required to wear safety goggles and shoes with closed toes (not sandals). Your TA will supervise the laboratories and direct your work. He will discuss related material, demonstrate unfamiliar techniques, and answer questions. The goal of the laboratory is to provide experience with a variety of techniques and to illustrate the principles we are discussing in lecture. We especially want you to learn to generate accurate and precise quantitative results and to interpret them critically. You must come to the laboratory prepared, having read and understood the procedure, and completed a statement of the objective of the experiment in your notebook. Your TA will give you more detailed instructions for the pre - laboratory assignments. You must keep a laboratory notebook providing a detailed record of your primary data, as described in the manual, and you must prepare a report for each laboratory. The style and detail of the laboratory reports will vary with the experiments. *You must complete the laboratory to pass the course.*

University of Wisconsin
Chemistry 115 – Chemical Principles I (Weisshaar)
Fall Semester 2016
Laboratory Schedule

	Scheduled Experiment
Week 1 (9/5)	Check-in/Series of Reactions
Week 2 (9/12)	Synthesis of Cu-Ammine Compounds
Week 3 (9/19)	Synthesis of Cu-Ammine Compounds—Day 2
Week 4 (9/26)	*Literature Searches—(Ariel Andrea)*
Week 5 (10/3)	Propagation of Error
Week 6 (10/10)	Crystal Violet*
Week 7 (10/17)	*Computer Activity: Potential Wells and the Hydrogen Atom*
Week 8 (10/24)	Atomic Emission*
Week 9 (10/31)	*Computer Activity: Molecular Orbitals*
Week 10 (11/7)	Spectrophotometric Determination of Fe/Measuring Fe in Cereal
Week 11 (11/14)	Nine Solutions
Week 12 (11/21) (meeting M&T)	Window on the Solid State (online activity) Neutron Activation Energy of $Silver^{+}$
Week 13 (11/28)	Dumas Method and GC-MS
Week 14 (12/5)	*Presentations***
Week 15 (12/12)	Solid State Structures and Properties Optical Diffraction *Check Out*

Lab is scheduled for Thursday from 7:45 AM to 10:45 AM in room 2365 for section 891 and Wednesday from 2:25 PM – 5:25 PM in room 2365 for section 892.

*Laboratory report should be submitted as a formal paper.
+Labs this week will be on Monday afternoon and Tuesday morning.
**Presentations will occur on Monday/Wednesday afternoons and Tuesday/Thursday mornings of week 14.

Entries in italics do not require lab attire for performing experimental work.