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Chemistry 117 General Chemistry Principles

I. Course Description and Learning Outcomes

Chemistry 117 is described in the course catalog as follows:

Laws and principles of chemistry including atomic and molecular structure, review of stoichiometry, descriptive inorganic chemistry of the representative and transition elements, chemical equilibria, electrochemistry, thermodynamics, and chemical kinetics.

While the course description gives you an idea of *content*, I have some broader objectives for Chemistry 117. In particular, I want to help each of you do the following:

- Use chemical theories to explain physical phenomena.
- Develop laboratory skills that will allow you to function safely and productively, both in teams and independently.
- Use chemical principles, both simple and abstract, to solve a variety of chemical problems.
- Communicate—in a lucid, convincing manner—solutions to scientific problems.

Chemistry 117 also satisfies the following General Education Learning Outcomes:

- Identify the basic taxonomy and principles of the scientific method as it pertains to the natural, physical world.
- Infer relationships, make predictions and solve problems based on an analysis of evidence or scientific information.
- Apply scientific concepts, quantitative techniques and methods to solving problems and making decisions.
- Describe the relevance of some aspect of the natural sciences to your lives and society.

Regardless of race, ethnicity, gender, sexual orientation, beliefs, socio-economic status, or cognitive ability, you should feel comfortable in this class. If at any point you feel uncomfortable please let me know. And remember— *don't be afraid to ask questions! There is no such thing as a dumb question!*

II. General Information

Schedule for Fall Semester, 2017

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|-------|----------------|---------------------------------|------------|------------------------|------------------------|
| 08:00 | Off campus | R, P, G | Off campus | R, P, G | R, P, G |
| 09:00 | Off campus | Chem 117 Lec., A111 | Off campus | Chem 117 Lec., A111 | Chem 117 Lec., A111 |
| 10:00 | R, P, G | Office Hour | R, P, G | R, P, G | R, P, G |
| 11:00 | R, P, G | R, P, G | R, P, G | Chem 117 Lab, C128 | R, P, G |
| 12:00 | R, P, G | Chem 117 Discussion, A111 | R, P, G | Chem 117 Lab, C128 | R, P, G |
| 1:00 | R, P, G | Office Hour | R, P, G | Chem 117 Lab, C128 | R, P, G |
| 2:00 | Office Hour | R, P, G | R, P, G | R, P, G | Meetings or Seminar |
| 3:00 | R, P, G | R, P, G | Meetings | Meetings | Meetings or Seminar |
| 4:00 | R, P, G | R, P, G | Meetings | Meetings | Meetings or Seminar |

Other office hours are available by appointment (send me an e-mail!). R, P, G stands for Research, Projects, Grading.

A. Electronic Resources

D2L (<http://www.uwsp.edu/d2l/Pages/default.aspx>) is a course management system. I'll use it as a repository for lecture notes (pdf format) and audio files of the lecture (mp3 format). The mp3 files can be listened to with either iTunes or Windows Media Player. I'll also post handouts, presentations from class, screencasts, and other goodies here.

B. Attendance, Absences, and Make-ups

Chemistry is a fascinating, complex, and *interactive* subject. It is in your best interest to attend all lectures, labs, and discussions. If you miss a lecture, please get the notes as soon as possible.

Make-up exams and make-up labs will not be allowed, except under the following circumstances:

- UWSP Athletic event (I require **written** authorization from your coach)
- Armed forces related training / drills (I require **written** authorization from a supervising officer)

- c. Medical emergency (I require **written** authorization from a physician)
- d. Death in the family (I require documentation of some type; an obituary or service folder is acceptable)

Other situations, e.g. oversleeping, forgetting, etc., are not valid excuses for missing a scheduled lab or exam.

III. Required and Supplementary Materials

- a. Course text (**Required**): Oxtoby, D. W.; Gillis, H. P.; Butler, L. J. *Principles of Modern Chemistry*, 8th ed.; Cengage Learning, Inc.: Boston, 2015. *Available at text rental in the Campus Bookstore.*
- b. Chem 117 Laboratory Manual and a 1-in., 3-ring binder (**Required**), Fall 2017 semester. *Available for purchase in the bookstore.*
- c. Laboratory Notebook (**Required**; hard bound, available at Target, Walmart, Walgreens, etc.)
- d. Notebook for homework problems (**Required**, same type as Laboratory Notebook listed above)
- e. A scientific calculator with logarithmic functions (**Required**). *Available at the Campus Bookstore, Staples, or other office supply stores. **Calculators with keyboards or QWERTY interfaces, iPads, and iPhones, etc., will not be allowed.***
- f. You may use electronic devices to take notes.

IV. Exams

Exams are my most important tool for assessing your learning. While I encourage collaboration on homework and in lab, you ultimately need to be able to work problems independently, with just the knowledge you have. In keeping with this philosophy I've established the following policy—**failing a combination of ANY 4 exams will result in an automatic F for the course.** Please keep this in mind as you take a look at your grades for the semester.

Exams will be **closed book** and given in the evening; you will work on them independently. The questions asked will be similar to ones you'll see in the text and in class. What does that mean? Practice, practice, practice! Practicing problems is one of the best ways to prepare for exams.

V. Homework

Homework will be given based on each chapter we cover. There will be a homework assignment for each chapter. Some of the problems will be straight out of Oxtoby; other problems will be original. You must make an honest effort to work on those problems, and by that, I mean 1) attempting each problem and 2) showing your work for each problem. I will randomly choose two problems to grade on homework, with each problem worth 10 points, for a total of 20 points. I'll post the solutions to those problems after they're due.

VI. Discussion

I typically use Discussion as a place for you to work, *with each other*, on problems. I may also use Discussion as a fourth lecture. In either case, Discussion attendance is mandatory!

VII. Laboratory

Thursdays from 11AM – 2PM, Room C128

One of the most important (and exciting!) parts of chemistry is the laboratory. Here is where you get a chance to explore the topics we've discussed in lecture. At the start of each lab I will give a little introduction, as well as some safety tips for the week. I'll let you know when lab reports are due, and what form they should take, before each lab. Have fun!

Schedule of Laboratory Activities

| Week | Date | Experiment |
|------|-------|---|
| 1 | 9/7 | Calculation Review |
| 2 | 9/14 | 1. Volumetric Analysis |
| 3 | 9/21 | 2. Synthesis of $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]^{2+}$ |
| 4 | 9/28 | 3. Spectrophotometric and Gravimetric Analysis of $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}]^{2+}$ |
| 5 | 10/5 | 4. Week 1: Computational Chemistry and Applications to Energy |
| 6 | 10/12 | 5. Week 2: Computational Chemistry and Applications to VSEPR and Molecular Orbital Theory |
| 7 | 10/19 | 6. Solubility of Liquids and Salts <i>or</i> Discussion |
| 8 | 10/26 | 7. Freezing Point Depression Analysis |
| 9 | 11/2 | 8. Lattice Enthalpy Estimation |
| 10 | 11/9 | 9. Temperature Dependence of the Solubility of Potassium Nitrate and the Thermodynamics of KNO_3 Dissolution |
| 11 | 11/16 | 10. Titrimetric Analysis of an Unknown Acid |
| 12 | 11/23 | Thanksgiving Break! |
| 13 | 11/30 | 11. Analysis of an Acid/base Titration Curve |
| 14 | 12/7 | 12. The Decomposition of Crystal Violet and Checkout |

VIII. Tentative Schedule of Course Material

| Week | Dates | Chapter from Oxtoby | Theme |
|-------------|--------------|----------------------------|--|
| 1 | 9/8 | Review: C1 and C2 | Review |
| 2 | 9/15 | Review: C1 and C2 | |
| 3 | 9/22 | C4 | Atomic and Molecular Structure |
| 4 | 9/29 | C5 | |
| 5 | 10/6 | C3 | |
| 6 | 10/13 | C6 | |
| 7 | 10/20 | C9 | Consequences of Atomic and Molecular Structure |
| 8 | 10/27 | C10 | |
| 9 | 11/3 | C11 | Thermodynamics and Equilibrium |
| 10 | 11/10 | C12 | |
| 11 | 11/17 | C13 | |
| 12 | 11/24 | C14 | |
| 13 | 12/1 | C15/C16 | |
| 14 | 12/8 | C17 | |
| 15 | 12/15 | C18 | Kinetics |

Exam Schedule

| Exam | Date | Time | Room |
|-------------|----------------|-------------------|-------------|
| Exam 1 | TBA | 6PM – 8PM | TBA |
| Exam 2 | Tuesday, 9/26 | 6PM – 8PM | A107 |
| Exam 3 | Tuesday, 10/17 | 6PM – 8PM | A107 |
| Exam 4 | Tuesday, 11/28 | 6PM – 8PM | A107 |
| Final Exam | Tuesday, 12/19 | 10:15AM – 12:15PM | A111 |

Important Dates

| | |
|---------------------|--|
| September 14 | Last day to add or drop a 16-week course without a grade |
| November 10 | Last day to drop a 16 wk course |

IX. Grading

A general breakdown of grading, along with point values, is listed below.

| Assessment | Course Point Allocations |
|--|--------------------------|
| Four exams | 400 pts. |
| 11 problem sets | 220 pts. |
| 10 lab reports | 250 pts. |
| 2 “formal” lab reports | 200 pts. |
| 3 Essays, <i>The Same and Not the Same</i> | 60 pts. |
| Final exam | 100 pts. |
| Total | 1230 pts. |

Total points accumulated will be converted to a percentage of the total points possible. I reserve the right to adjust these cut-off points, but in no case will the cut-off for a particular grade be higher than those listed.

Grades: A, 93 – 100%; A-, 90 – 93%; B+, 87 – 90%; B, 83 – 87%; B-, 80 – 83%; C+, 77 – 80%; C, 73 – 77%; C-, 70 – 73%; D+, 67 – 70%; D, 63 – 67%; F, 63%

Remember—Failing a combination of ANY 4 exams will result in an automatic F for the course!

X. Etiquette and Inclusive Excellence

Regardless of gender, race, religion, or sexual orientation, you should feel safe and comfortable in this class. If at any point you think something is amiss, please let me know. It is absolutely essential that you show respect to your peers and your instructor. Therefore, the following will **not** be tolerated:

a. Cell phones/iPhones/other electronic devices. **If it's not being used to take notes, power it down and put it away.**

b. Improperly formatted e-mails. **Sending an e-mail is not like texting or tweeting.** A properly formatted e-mail should look like a letter, with a subject, salutation, body, and "signature". E-mails are routinely used as a way of effectively communicating ideas. Poorly written e-mails only serve—at best—to confuse and annoy the reader, and—at worst—to portray you as uneducated.

c. Mocking/heckling others

d. Working on other assignments during class

XI. Academic Misconduct

Full information on academic misconduct can be found at:

<http://www.uwsp.edu/dos/Pages/Academic-Misconduct.aspx>. Academic misconduct is a serious matter, with a wide-range of penalties. Please familiarize yourself with faculty, staff, and student rights and responsibilities regarding academic misconduct.

Academic misconduct is serious, and puts tremendous stress on everyone involved. When in doubt, come see me!

XII. Disability Services

There are a number of resources available for students with documented disabilities. A full listing of them can be found at <http://www.uwsp.edu/disability/Pages/default.aspx>. Please be aware that, in order to take advantage of some of the services, you must provide me with an Accommodation Request Form I will sign. You must return the form to Disability Services.

XIII. Skills to work on

There are essential skills you must develop in order to succeed in General Chemistry.

1. *Reading and understanding word problems.* You need to be able to pick apart a problem quickly and efficiently, and be able to solve it. Come see me if you have any questions!
2. *Drawing.* One of the biggest aides in solving problems, and thinking in general, is being able to draw a picture to help you piece a solution together. You'll see me doing it the entire semester.
3. *Algebra.* Believe it or not, there's plenty of algebra in chemistry. Let me know if you have any problems.
4. *Independent study.* It is impossible to cover every type of problem, concept, etc. Reading the book and learning to understand material is critical to success. Does this mean you're on your own? No! Ask questions!
5. *Don't be afraid to ask questions; no question is "dumb"!* Chances are if you have a question, most of the other people in the room are thinking it, too! But even if we can't get to it in class, come see me. No matter what the question, we'll work it out.
6. *Take advantage of discussion sections.* I will always come to discussion sections with something prepared. However, if you have any questions, ask! This is a time to work through problems we don't work through in class!

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Notification of Course Policies and Procedures

Name (please print): _____

I have received a copy of the course syllabus and Dr. D'Acchioli has reviewed the contents with our class. I understand that I can approach Dr. D'Acchioli for further clarification of the policies and procedures in Chemistry 117.

By signing below, I agree to abide by all policies and procedures present in this syllabus.

Signature: _____ **Date:** _____