



Chemistry in our World

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| Lecturer: | Dr. Paul Hooker |
| Office: | Room 1110 Chemistry |
| E-mail: | phooker@wisc.edu |
| Office Hours: | M/W/F 10 am to 11:00 am T 10 am to 12 pm |
| Lectures: | M/W/F 12:05-12:55 pm, EDUC SCI 204 |
| Labs: | Room 1329 |
| Discussion: | As Assigned |
| Credit Hours: | 5 (Traditional Carnegie Definition) |
| Course Website on Canvas: | https://canvas.wisc.edu/ |
| General Chemistry Homepage: | http://genchem.chem.wisc.edu/ |
| Undergraduate Chemistry Office: | Room 1328 Chemistry 263-2424 |
| Important Dates: | Deadline for 100% Refund: 2/1/2019 Final Drop Date: 3/29/2019 Final Exam: 5/7/19 10:05 am |

COURSE INFORMATION

Description

Chemistry 108 is a one-semester introductory course that includes selected topics in inorganic and organic chemistry. Emphasis is on relevance to biological, environmental and societal issues. Chemistry 108 is not intended for students who expect to take additional chemistry courses and it does not satisfy any prerequisites for further chemistry courses.

Prerequisites

Not open to students who have taken CHEM 104, CHEM 109, or CHEM 115

Course Designations and Attributes

Level: Elementary

Breadth: Physical Science

L&S Credit: Counts as L&S credit

Instructional Mode

Face-to-face

How Credit Hours are Met

This is a 5-credit class that meets three times weekly for 50 minutes of lecture, once a week for 50 minutes of discussion, and once a week for 2 hours of laboratory. Students are expected to do at least 225 hours learning activities which includes class attendance, lab attendance, reading, studying, preparation, problem sets, lab reports and other learning activities.

TEACHING ASSISTANTS

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|-----------------|---|
| Sungho Park | Sections 841/842 TA Desk Office Hours: Tuesday 9 – 10 am |
| Amber Lin | Sections 843/844 TA Desk Office Hours: Tuesday 11 – 12 pm |
| Madison Fellows | Sections 845/846 TA Desk 43 Office Hours: Friday 8:30 am – 9:30 am |
| Mary Hawgood | Sections 849/850 TA Desk Office Hours: Monday 10 – 11 am |
| Laura Elmendorf | Sections 851/852 TA Desk Office Hours: Monday |

COURSE PHILOSOPHY

Unlike more traditional chemistry courses where the chemistry content is the central theme, in CHEM 108 the chemistry concepts will be introduced on a need-to-know basis as various contemporary topics and themes are explored. As well as gaining understanding about basic chemistry principles, students are also expected to apply their chemical knowledge to understand complex issues.

Upon completion of this course you will have acquired a foundation of knowledge in basic chemistry principles. Although there are plenty of resources to help you achieve this goal your grade will be determined by your ability to demonstrate your comprehension and knowledge by completing quality lab reports, assignments, and performance in tests and quizzes. Your grade is not determined by my perception, or your perception, of the time and effort you put into the class. Investing the necessary time and effort is an expectation.

REQUIRED MATERIALS

1. Students will use an eTextbook and the CONNECT digital learning tool (DLT, e.g., homework or lab software package) for this course and **DO NOT** need to buy a print version. The eText and DLT will cost \$60 and will be accessible via the Canvas course site no later than the first day of classes. The fee will be billed via the students' tuition bills. eTexts are typically 40-80% lower than list print prices. For more information about the UW-Madison eText Pilot, visit: [https://edinnovation.wisc.edu/engage-etext-pilot/.](https://edinnovation.wisc.edu/engage-etext-pilot/))

2. Chemistry 108 Laboratory Manual. The manual can be purchased from CHEM 1375 between Jan 22 and Feb 1st using your WiscCard only.

3. Indirectly vented industrial quality eye protection is required in all chemistry laboratories. These, and ones that fit over regular glasses, can be purchased from the University Bookstore or from CHEM 1375 between Jan 22 and Feb 1st.

4. The whole-class sessions will make extensive use of student "voting" concept tests, surveys, and other questions. We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones or tablets (via the Top Hat app), laptops (via their website), or through text message (tutorial link here). Top Hat is the supported student response tool at UW-Madison, and you may be using Top Hat in multiple classes throughout the academic year.

You can visit the Top Hat Overview, which outlines how you will register for a Top Hat account and provides a brief overview to get you up and running on the system. You can register via the Top Hat website. This registration will cost \$ for one semester, \$ for one year or \$ for life. Follow these directions to set up your account. **The specific course code for CHEM 108 is 832559**

Should you require assistance with Top Hat at any time, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888 -663-5491.

5. An electronic calculator – either an inexpensive scientific or graphing calculator. Cell phone calculators are not allowed to be used in the laboratory or on tests.

6. For those students who wish to purchase a hard copy or printed version of the text (in addition to the eTextbook), the details are below:

Title: Chemistry in Context: Applying Chemistry to Society, 9th Edition, 2018.

Authors: Fahlman, Mury, Daubenmire, Bentley, Kirk, Ellis, Purvis-Roberts

Publisher: American Chemical Society and McGraw Hill

COURSE ORGANIZATION

There are four components of CHEM 108; Pre Class Activity, Whole Class (Lecture) Session, Discussion and Lab.

Pre Class Activity

Pre class activities are available through CONNECT, and as the name implies, must be completed before each whole class (lecture) session.

Lecture

There are three whole class sessions per week each 50 minutes in length. During lectures you will be introduced to concepts, work through numerical problems, watch demonstrations, and answer questions using the Top Hat application (counts towards final grade). To facilitate effective note taking the PowerPoint slides will be available for you to print out and bring to class. At the end of each unit you will have a completed set of notes which will help you review for midterm exams. At the end of the course you will have a complete set of notes which will prove extremely useful for the final examination. Augmenting your notes using the textbook as a resource will also be an effective part of your learning strategy.

With large classes respectful classroom etiquette is expected. Cell phones should be silenced. While laptops are not prohibited in class, you will not have any need for them during lecture except to take notes. Using the computer or other devices during class for activities not related to the class is very distracting, not only for you but for those who are sitting nearby. As much as possible class will be dismissed at 12:55 PM, but sometimes just another minute or two is needed to finish up. Please be considerate of your classmates.

Discussion Section

Two times each week, for 50 minutes, you will meet with a teaching assistant (TA) and your classmates for discussion. In these meetings, you will discuss problems, work with groups of students to learn new material or reinforce/review existing ideas, learn about upcoming laboratory assignments, have a forum for answering questions, and take quizzes.

Laboratory

To pass this class you cannot miss more than two laboratory exercises.

The laboratory experiments are a vital part of this course; you will develop skills that are not easily learned or demonstrated in lectures. These skills include:

- Designing experiments and interpreting data
- Using laboratory equipment properly
- Working with your fellow students in the laboratory
- Communicating your ideas about the data through discussions and writing

Your laboratory report is almost always due at the end of the 3 hour laboratory period. Late laboratory reports are not graded. The lab schedule is printed on the attached calendar.

Please note that sandals are not acceptable footwear in the laboratory. Contact lenses should **not** be worn in the laboratory because fumes or splashes may be caught between them and your eye. Further attire requirements are described in your laboratory manual and by your TA.

There is no opportunity to make up a laboratory that you miss; a grade of zero will be recorded for unexcused absences. If you have an excuse for missing lab, notify your TA as soon as possible, preferably before the lab period. The lowest lab grade of the semester will be dropped.

Health or Disability Concerns. If you have special needs, please make an appointment to speak to your lecturer and TA at your earliest convenience.

PROBLEM SETS AND HOMEWORK

Problem solving is a crucial aspect of this course and study problems will be assigned on a regular basis through CONNECT. Supplementary problems will also be worked on in Discussion sections. Your textbook is an excellent source of additional practice problems, and answers to selected problems are given at the back of the book.

EXAMS AND QUIZZES

Quizzes. Quizzes will be given during discussion sections to help you evaluate your progress and to encourage you to memorize essential information.

Exams. There will be three in-class exams of 50 minutes each and one two-hour comprehensive final exam. **Makeup exams will be only be arranged under extenuating circumstances given and prior permission, where possible, obtained.** Exams may include questions based on the laboratory material. **Please be alert to these exam dates.** You must report any religious conflicts with exams or laboratory exercises to your teaching assistant within the first two weeks of classes.

| | | |
|-------------|-------------------------------|------------------|
| Exam Dates: | Wednesday, February 20 | 12:05 – 12:55 PM |
| | Wednesday, March 27 | 12:05 – 12:55 PM |
| | Wednesday, April 24 | 12:05 – 12:55 PM |

GRADES

Grade Distribution

Below is the letter grade distribution for this class

| | |
|----|--------|
| A | 93.0% |
| AB | 88.0% |
| B | 83.0% |
| BC | 78.0% |
| C | 70.0% |
| D | 60.0% |
| F | <60.0% |

This distribution will never be distributed up, i.e., a student achieving 93.0% or greater will receive an A grade, however, it may be distributed down (curved) depending on the final class grade distribution.

Grading Criteria

| | |
|-----------------------|---|
| Three 60-minute exams | 12% each |
| Homework Assignments | 8% (90% Correct completion for full credit) |
| Pre Class Assignments | 8% (90% Correct completion for full credit) |
| Laboratory | 20% (Drop lowest one) |
| Quizzes | 10% (Drop lowest one) |
| Tophat | 4% (80% Correct completion for full credit) |
| Final Exam | 14% |
| Total | 100% |

Your scores will be available through Canvas.

ADDITIONAL RESOURCES

Numerous resources are available to assist you with either this course in particular or college life in general. It is up to you to take advantage of these resources to ensure your success both in this course and at UW-Madison.

Course Web-site on Learn@UW (<https://learnuw.wisc.edu/>): Our Canvas course website can be accessed via Learn@UW. The syllabus, schedules, office hours, Powerpoint slides, course handouts, announcements and grades will all be available on Canvas.

Study Groups: You may collaborate with other students on homework assignments and laboratory discussion questions. Study groups reflect the teamwork inherent in the way modern science is done; scientists frequently collaborate with others, either within the same department or at a distance with persons in other cities, states or countries. It is important to realize that although you may collaborate with other students on assignments, the work you submit must be your own.

Tutoring Services: A number of tutoring resources are available on campus, some free and some for a fee. For more information, see our Learn@UW site or the General Chemistry home page (<http://genchem.chem.wisc.edu/>) under the "More for Students" section.

Students with Disabilities: Appropriate accommodations for lecture, laboratory, discussion, and/or exams can be arranged for students with disabilities. The McBurney Disability Resource Center (<http://www.mcburney.wisc.edu/>) can provide assistance. Accommodations still must be made well in advance, so please pursue these avenues immediately.

Advising and Counseling Services (University Health Services): College life can be stressful. If you are struggling with your academic course load or other academic issues, your advisor is a good resource. If you are struggling emotionally with anxiety, depression, or other health issues, individual counseling is available at University Counseling and Consultation Services. For more information go their website (http://www.uhs.wisc.edu/home.jsp?cat_id=36) or call 265-5600. Crisis intervention services are also available 24 hours a day by dialing this same phone number and pressing option 9.

Academic Misconduct: It is expected that all students will conduct themselves with honesty,

integrity, and professionalism. Any student caught cheating on an exam will receive an F in the course. Any student caught cheating on homework, a quiz, or lab (for instance, copying another person's work or fabricating data) will receive a zero for that assignment. A second infraction will result in an F for the course. More information on what constitutes academic misconduct and policies on handling misconduct can be found in your chemistry lab manual and at the following website: <https://conduct.students.wisc.edu/academic-integrity/>.

COURSE TOPICS

| Unit | Chapter | Chemistry Concepts |
|---|---------|--|
| Unit 1: Preliminaries | 1 | Atomic Structure of the Nucleus Dalton's Atomic Theory Ionic Compounds Metric Conversions Physical and Chemical Changes |
| Unit 2: The Air we Breathe | 2 | Classification of Matter Elements, Atoms, and Molecules Naming Molecular Compounds Alkanes Writing Balanced Chemical Equations |
| Unit 3: Radiation from the Sun: The Ozone Layer | 3 | Lewis Structures of Molecules Electromagnetic Radiation |
| Unit 4: Energy from Combustion | 5 | Moles Thermochemistry |
| Unit 5: Greenhouse Gases and Global Warming | 4 | Moles |
| Unit 6: Energy from Alternative Sources: Nuclear Chemistry, Radioactivity, and Solar Energy | 6 | Nuclear Chemistry |
| Unit 7: Water and Solutions | 8 | Molecular Geometry Water H-Bonding, |
| Unit 8: Acid Rain and Ocean Acidification | 8 | Aqueous Solutions (Electrolytes) Acid/Base |
| Unit 9: Plastics and Polymers | 9 | Organic Compounds Polymers |
| Unit 10: Nutrition and Food | 11 | Biochemistry |

COURSE SCHEDULE

Dates for lecture topics are **approximate**. The exam dates are **fixed**. The course website on Canvas will have details of the specific recordings to watch and assignment due dates.

| Week | Class | | Lab |
|-------------|--|--|---|
| 1 | Class 1 1/23 Class 2 1/25 | Introduction Unit 1 Unit 1 | No lab Scheduled |
| 2 | Class 3 1/28 Class 4 1/30 Class 5 2/1 | Unit 1 Unit 1 Unit 2 | Lab 0: Lab Check In Lab 1: Physical and Chemical Changes |
| 3 | Class 6 2/4 Class 7 2/6 Class 8 2/8 | Unit 2 Unit 2 Unit 3 | Lab 2: Preparation and Properties of Gases in Air |
| 4 | Class 9 2/11 Class 10 2/13 Class 11 2/15 | Unit 3 Unit 3 Unit 3 | Lab 3: Refrigerant Gases |
| 5 | Class 12 2/18 EXAM 1 2/20 Class 14 2/22 | Catch Up/Review Units 1, 2, 3 Unit 4 | No Laboratory Scheduled |
| 6 | Class 15 2/25 Class 16 2/27 Class 17 3/1 | Unit 4 Unit 4 Unit 5 | Lab 4: Energy Content and Fuels |
| 7 | Class 18 3/4 Class 19 3/6 Class 20 3/8 | Unit 5 Unit 5 Unit 5 | Lab 5: Light in Our Atmosphere |
| 8 | Class 21 3/11 Class 22 3/13 Class 23 3/15 | Unit 5 Unit 6 Unit 6 | Lab 6: Synthesis of Biodiesel |

| Week | Class | | Lab |
|-------------|--|-------------------------------------|---|
| 9 | Class 24 3/25 EXAM 2 3/27 Class 26 3/29 | Unit 6 Units 4, 5, (6) Unit 6 | No Laboratory Scheduled |
| 10 | Class 27 4/1 Class 28 4/3 Class 29 4/5 | Unit 6 Unit 7 Unit 7 | Lab 7: Molecular Models |
| 11 | Class 30 4/8 Class 31 4/10 Class 32 4/12 | Unit 7 Unit 8 Unit 8 | Lab 8: pH of Rain and Other Common Substances |
| 12 | Class 33 4/15 Class 34 4/17 Class 35 4/19 | Unit 9 Unit 9 Unit 9 | Lab 9: Plastics |
| 13 | Class 36 4/22 EXAM 3 4/24 Class 38 4/26 | Unit 9 Units 7, 8, 9 Unit 10 | No Lab Scheduled |
| 14 | Class 39 4/29 Class 40 5/1 Class 41 5/3 | Unit 10 Unit 10 Unit 10 | Lab 10: How Much Sugar is there in Soft Drinks and Fruit Juices? Lab Check Out |
| 15 | FINAL 5/7 | 2:45 pm – 4:45 pm | |

CHEMISTRY 108 LEARNING OUTCOMES

1. Students will gain an understanding in a breadth of basic chemical concepts and principles.

To be successful, a student must be able to:

- a. Diagram and explain chemical concepts and principles.
- b. Develop the practice of chemistry problem solving.

2. Students will apply chemical concepts and theories to real-world contemporary issues

To be successful, a student must be able to:

- a. Describe selected real-world issues from a scientific perspective.
- b. Be able to critically evaluate solutions to real-world issues from a scientific perspective.
- c. Develop the capacity to differentiate between “pseudo-science” and actual science.

3. Students will develop the ability to solve a variety of integrative chemistry problems.

To be successful, a student must be able to:

- a. Identify the chemical concepts and principles needed to solve a chemistry problem.
- b. Integrate several concepts to solve multifaceted chemistry problems.
- c. Assess the validity of an answer to a given problem.

4. Students will apply submicroscopic models of matter to explain observable macroscopic phenomena.

To be successful, a student must be able to:

- a. Deconstruct the particulate nature of matter into its three physical states, its atomic interactions, and the influences of these interactions in the macroscopic world.
- b. Predict and describe the outcome of selected chemical reactions.

5. Students will be able to conduct and analyze experiments safely and successfully.

To be successful, a student must be able to:

- a. Anticipate potential laboratory hazards for individual experiments, based on familiarity with lab policies, procedures and protocol.
- b. Analyze laboratory observations and data to formulate appropriate scientific conclusions.

6. Students will develop the study skills and habits of independent learners.

To be successful, a student must be able to:

- a. Practice problem-solving skills and strategies modeled in class sessions and promoted in course activities.
- b. Diagnose questions or misconceptions about chemical concepts and principles via self-assessment opportunities.

c. Build a repertoire of personal studying activities that leverage his/her learning strengths and engage him/her with course concepts.

7. Students will articulate chemical knowledge and understanding in a written context.

To be successful, a student must be able to:

- a. Write scientifically sound and comprehensive laboratory reports.
- b. Answer conceptual chemistry problems in clear, concise language supported by relevant chemistry principles and examples.
- c. Employ accurately scientific language and chemical terms.