Course Content:

This course is an introduction to modern chemistry. Lectures will closely follow the text. However, lectures are not simple recounts of the assigned reading material but rather are intended to supplement and focus the text. Regular class attendance is, therefore, expected. It is assumed that you have had algebra (including logarithms) in high school. If your math skills are weak, you should not be in this course. If you have any doubts or questions about your preparation, you are strongly urged to consult with me as soon as possible.

<table>
<thead>
<tr>
<th>Date (approximate)</th>
<th>Chapter</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Aug. 24 – 28</td>
<td>1</td>
<td>Essential Ideas</td>
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<tr>
<td>Aug. 31 – Sept. 9</td>
<td>2</td>
<td>Atoms, Molecules, and Ions</td>
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<tr>
<td>Sept. 11 – 18</td>
<td>4.1, 3.1 – 3.2, 4.3 – 4.4</td>
<td>Composition and Stoichiometry</td>
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<td>Sept. 21</td>
<td>3.3, 4.2, 4.5</td>
<td>Reactions in Aqueous Solutions</td>
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<td>Sept. 23</td>
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<td>Exam #1</td>
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<tr>
<td>Sept. 25 – Oct. 7</td>
<td>3.3, 4.2, 4.5</td>
<td>Reactions in Aqueous Solutions</td>
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<td>Oct. 9 – 14</td>
<td>9</td>
<td>Gases</td>
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<tr>
<td>Oct. 16 – 19</td>
<td>5</td>
<td>Thermochemistry</td>
</tr>
<tr>
<td>Oct. 21</td>
<td>6.1 – 6.4</td>
<td>Electronic Structure of Elements</td>
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<tr>
<td>Oct. 23</td>
<td></td>
<td>Exam #2</td>
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<tr>
<td>Oct. 26 – Nov. 13</td>
<td>6.1 – 6.4</td>
<td>Electronic Structure of Elements</td>
</tr>
<tr>
<td>Nov. 16 - 18</td>
<td>6.5, 7.1, 7.5, 7.3 – 7.4</td>
<td>Periodic Variations in Element Properties Ionic Compounds and Lewis Structures</td>
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<tr>
<td>Nov. 20</td>
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<td>Exam #3</td>
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<tr>
<td>Nov. 23 – 28</td>
<td></td>
<td>No classes – Thanksgiving</td>
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<tr>
<td>Dec. 1 – 11 Remote</td>
<td>7.5, 7.3 – 7.4</td>
<td>Molecular Geometry, Hybrid Orbitals</td>
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<tr>
<td>Dec. 14 - 18</td>
<td></td>
<td>Final Exams</td>
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Course Objectives:

The fundamental goal of this course is to provide science majors with an understanding of the principles of chemical structure and reactivity that underlie physical phenomena studied in subsequent coursework and the laboratory. After completion of this course, the successful student will have gained an understanding and be able to solve problems relating to (and not limited to) the following concepts:

- Scientific methods and measurements
- Unit analysis, problem solving (both on paper and using physical materials)
- Atomic structure, including electronic structure and its relationship with chemical properties
- Chemical reactions - how and why they happen in terms of thermodynamics and volume relationships (Gas Laws)
- Molecular structure, including chemical bonding
- Understanding the strengths and limitations of scientific models, why they are needed, and what they mean to help bridge the gap between the microscopic and the macroscopic view of the universe.

Essentially, this course is designed to serve as a transition from a student’s ability to retain facts and replicate solutions toward an increased understanding of scientific fundamentals and the use of these fundamentals in critical thinking and problem-solving. For this reason, an emphasis will be placed on improving problem-solving skills and critical thinking abilities through challenging assignments and examinations. Students who struggle with chemistry often do so because they fail to see the significant conceptual relationships between chemical concepts or do not understand fundamental definitions. A common result is that large amounts of time are spent on memorization and dissection of equations/techniques that are only used in specific problems. If this happens to you, you need to change the way you study chemistry.

1. **Study the chapter before coming to class** and be ready to ask questions. This will allow you to see the significant relationships.

2. Spend time working and understanding the problems (understanding why you are getting a problem wrong is a big step towards getting it right). There are no shortcuts, and if you don’t invest the time, undesirable results may follow

3. Take time beyond just doing homework to study a bit each day (~20 minutes, 3 times, at various times of the day. This will cause you to integrate and retain information better.

**Note:** Everyone is different, and some may require more time than what is given here!.)
Grading:

There will be three (3) 100 point exams. The fixed dates are Wednesday, September 23; Friday, October 23; and Friday, November 20. Examinations will be given in the regular class period on dates above. Plan your schedule accordingly. Exams may include problems, short answer, and some essay. Partial credit is given only if you show your work. Points will be deducted for not including units and not using the correct number of significant figures in your final answer. The final exam will be the same format as the three exams, is worth 200 points, and is comprehensive (for the semester).

There will be one or more problems assigned at the beginning of each lecture. The Monday problem will be due at the beginning of the Wednesday lecture, the Wednesday problem will be due at the beginning of the Friday lecture, and the Friday problem will be due at the beginning of the Monday lecture. Turned in problems will consist of the original handout, with your name and the date at the top. The complete worked out solution must always be given and numerical answers circled. They will be turned in to the proper folder before class starts. If you forget (or miss getting) the daily problem handout, you can pick one up in my office within one day. You can, and are encouraged to, work together in small groups. However, this does not mean that one person does the problem and the rest of the group copies it. If a number of problems are turned in with exactly the same work, in exactly the same format and, usually, wrong in the same way, all those papers will receive a score of zero. The daily problems will not be accepted early or late under any circumstances. They are graded as follows:

- Correct work and answer: 2 pts.
- Correct answer, but incorrect significant figures: 1.75 pts.
- Correct answer, but incorrect or missing units: 1.75 pts.
- Not circling numerical answer: 1.75 pts.
- Attempted, but incorrect answer: 1 pt.
- Not using original handout: 0 pts.
- Showing work that is inappropriate for your answer: 0 pts.
- Showing no work: 0 pts.
- Turning the problem in at the end of class: 0 pts.
- Not turned in or minimal effort: 0 pts.
- Not picking up previous problem (if one turned in): 0 pts.

The total possible points for these problems is 90 points. In addition, there will be 10 discretionary points based on attendance, class participation, completion of assignments, etc., for a classroom total of 100 points. It is in your best interest to do the daily problem the same day. The daily problem often deals with lecture material covered that day.

There is a total of 600 possible points in this course.

A grade calculator is available at: chemistry.bd.psu.edu/jircitano/gradecalculator.xlsx
Grades:

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<tr>
<th>Grade</th>
<th>Range</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>558-600</td>
<td>100 - 93%</td>
</tr>
<tr>
<td>A–</td>
<td>540-557</td>
<td>90 - 92%</td>
</tr>
<tr>
<td>B+</td>
<td>522-539</td>
<td>87 - 89%</td>
</tr>
<tr>
<td>B</td>
<td>498-521</td>
<td>83 - 86%</td>
</tr>
<tr>
<td>B–</td>
<td>480-497</td>
<td>80 - 82%</td>
</tr>
<tr>
<td>C+</td>
<td>462-479</td>
<td>77 - 79%</td>
</tr>
<tr>
<td>C</td>
<td>420-461</td>
<td>70 - 76%</td>
</tr>
<tr>
<td>D</td>
<td>360-419</td>
<td>60 - 69%</td>
</tr>
<tr>
<td>F</td>
<td>0-359</td>
<td>0 - 59%</td>
</tr>
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Policies:

1. Good news: your textbook for this class is available free online! Your book is available in web view and PDF free. If you prefer, you can also get a print version at a very low cost. You can also choose to purchase on iBooks or get a print version via the campus bookstore or from OpenStax on Amazon.com. Web view is recommended -- the responsive design works on any device. If you buy on Amazon, use the openstax.org link so you get the official print version.

Chemistry 2nd Ed. from OpenStax, openstax.org/details/books/chemistry-2e

2. If you are lost or confused at any time, see me. Do not wait until the last week.

3. Class attendance, on time, is expected. Much of the daily problems and exams will be from the lecture. Students are advised to discuss attendance irregularities or poor class performance with the instructor. Do not simply stop your attendance. This could result in an F for the course. A grade of W is given to students who withdraw from the course prior to the Late Drop Period.

4. Makeup exams will only be given for legitimate absences officially recognized by Penn State University. No exceptions will be made to this. A student having a legitimate excuse for missing any of the three scheduled exams will be provided with a single make-up opportunity near the end of the semester. This make-up exam will cover the material of all exams. Individual make-ups following each exam will not be provided. It is the responsibility of the student to notify the instructor if an exam will be missed or immediately after missing the exam and to contact me by November 16 regarding scheduling the make-up exam.

5. A suggested set of homework problems are given for each chapter. These problems will not be graded.

6. Check your psu email daily. Any announcements or daily problems corrections will be sent to the entire class email list.

7. As a courtesy to others and the instructor, turn off cell phones before class! Texting during class is also very strongly discouraged.
8. Be aware that if you will be taking Chemistry 112 in the Spring semester, a standardized General Chemistry exam prepared by the American Chemical Society will be given. It is a 2-hour, comprehensive (Chemistry 110 and Chemistry 112), multiple-choice exam that will be part of your Chemistry 112 grade.

9. **Unless otherwise stated, the internet is not to be used for any work pertaining to Chem 110.**

10. In the event of campus closure, email and Canvas will be used to communicate changes in lectures, daily problems and examinations.

11. Grading issues, on any assignments, must be brought to my attention within one week of the assignment being returned. No point adjustments will be made after this time period.

**COVID-19**

We know from existing scientific data that wearing a mask in public can help prevent the spread of COVID-19 in the community (Lyu and Wehby, 2020; CDC, 2020; Johns Hopkins Medicine, 2020). Everyone – including the instructor – is required to wear a face mask in University buildings, including classrooms and labs. You MUST wear a mask appropriately (i.e., covering both your mouth and nose) in the building if you are attending class in person. Masks have been provided for students, faculty, and staff, and everyone is expected to wear one while on campus or out in the community.

All students, faculty and staff are expected to maintain social distancing (i.e., maintain at least six feet of space between individuals) when possible. Seating patterns and attendance patterns, including assigned seating and closed-off desks/chairs/room sections, have been established to help allow for this distance for your safety. It is also important to follow related guidance communicated by the University and via public postings/signage related to directional traffic flow and maximum occupancy of spaces.

You are not permitted to consume food or drink in classrooms, except for water. If you must drink water, please be especially conscious of maintaining social distancing and minimizing the time your mask is moved aside. Or, better yet, use a straw. Cooperation from EVERYONE will help control the spread of the virus and help us get back to the previous version of campus life as quickly as possible.

Students with conditions that make it difficult to wear a mask or who choose not to wear a mask may not attend class in person. This is to protect your health and safety as well as the health and safety of your classmates, instructor and the University community. Anyone attending class in person without a mask will be asked to put one on or leave. Refusal to comply with University policies is a violation of the Student Code of Conduct. Students who refuse to wear masks appropriately may face disciplinary action for Code of Conduct violations. See details here: [https://studentaffairs.psu.edu/support-safetyconduct/student-conduct/code-conduct](https://studentaffairs.psu.edu/support-safetyconduct/student-conduct/code-conduct)

**Academic Integrity**

Academic integrity is a basic guiding principle for all academic activity at the University, and all members of the community are expected to adhere to this principle. Specifically, academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. It includes
a commitment not to engage in or tolerate acts of falsification, misrepresentation, or deception. Such acts violate the fundamental ethical principles of the University community and undermine the efforts of others.

Violations of academic integrity are not tolerated at Penn State Behrend. Violators will receive academic sanctions and may receive disciplinary sanctions, including the awarding of an XF grade. In cases such as these, an XF grade is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so those repeat offenders can be sanctioned accordingly.

For more information: http://behrend.psu.edu/for-faculty-staff/faculty-resources/academic-integrity

Disabilities and Learning Differences

Penn State is strongly committed to providing full access to its programs and services for all individuals. The University encourages academically qualified students with disabilities to take advantage of the educational programs and accommodations offered at Penn State Behrend.

For more information: http://behrend.psu.edu/student-life/educational-equity-and-diversity/student-resources/students-with-disabilities-and-learning-differences

Educational Equity Concerns

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, harassment, and/or incivility due to age, ancestry, color, disability, gender, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity at the Report Bias site: http://equity.psu.edu/reportbias/statement.

Counseling and Psychological Services

Students with academic concerns related to this course should contact the instructor in person or via email. Students also may occasionally have personal issues that arise in the course of pursuing higher education that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the Penn State Behrend Personal Counseling Services at (814) 898-6504.

For more information: http://psbehrend.psu.edu/student-life/student-services/personal-counseling

Tutoring Help:

Contact the Learning Resource Center (LRC) at behrend.psu.edu/tutorappointments to make an appointment.

Special Note:

Do you receive loans, grants, or work study to help pay for college? Every semester Penn State is required by law to review your academic progress and determine your eligibility for financial aid for the future term. There are three components to making satisfactory academic progress: degree status, completion rate of attempted credits, and time-to-degree limits.
**Degree status:** If you are dropped from degree status, which may occur if you do not maintain a C average, you are ineligible for state and federal student aid - including loans.

**Completion rate of attempted credits:** You must earn a minimum of 67% of your cumulative attempted credits.

**Time-to-degree:** If you exceed 150 percent of the number of credits required for your degree program, you will have exceeded the time-to-degree limit. Work with your academic advisor to make sure you finish your degree in four years.

Questions about how your academic actions can affect your financial aid? Financial Aid Office, 2nd floor of the Metzgar Center 814-898-6162 behrendfinaid@psu.edu, http://studentaid.psu.edu/eligibility/federal-student-aid-satisfactory-academic-progress-standard/satisfactory-

**Copyright of Class Materials**

You may not share any information from this course (including notes and assignments) with others who are not currently registered for the course, nor post such information electronically without the permission of the instructor--this includes online note-taking/note-sharing services (See Penn State Administrative Policy AD-40). Also prohibited in the policy is the posting of audio, video, or photographs posted to social media sites or other publicly accessible resources. Unless you have my permission, you risk disciplinary sanctions

**Homework**

Chapter 1: 23, 33, 35, 39, 41, 45, 47, 49, 53, 63, 65, 67, 69, 71, 73, 75, 77, 81, 89

Chapter 2: 1, 11, 17, 19, 23, 29, 37, 39, 41, 45, 47, 49, 51, 53, 55, 57, 59, 61

Chapter 3.1 – 3.2: 3, 17, 19, 25, 31, 33, 37, 39, 41, 43

Chapter 4.1, 4.3 – 4.4: 3 (do not do b), 5, 7, 49, 51, 53, 55, 59, 61, 63, 69, 77

Chapter 4.2, 4.5: 17, 47, 79, 83, 87, 91, 93

Chapter 3.3: 47, 51, 55, 59, 61, 63

Chapter 9: 1, 5, 19, 21, 27, 29, 31, 33, 35, 45, 49, 53, 59, 63, 65, 67, 69, 79

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Chapter 6.1 – 6.4: 3, 5, 7, 9, 11, 27, 39, 45, 49, 51, 55, 57

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Chapter 6.5: 67, 69, 71, 73, 75, 77, 79, 83

Chapter 7.5, 7.3 – 7.4: 27, 29, 31, 47, 57, 59, 63, 77

Chapter 7.6, 7.2: 13, 15, 17, 91, 93, 95, 99, 101, 103