# General Chemistry F105X, 4.0 Credits
# Fall Semester, 2008


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| Instructor: | Dr. William A. Howard |
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**Prerequisites:** Placement or concurrent enrollment in ENGL F111X or higher; placement or concurrent enrollment in MATH F107X or higher; or a B or better in CHEM F103X; or permission of instructor and department chair. Placement in Math 107X requires a minimum SAT math score of 540/800 or ACT math of 23 with subscores of 14 or better. Placement in English 111X requires minimum SAT critical reading score of 430/800 or ACT English score of 17 or better. See p. 120 of 2007-2008 UAF Advisors Manual for more details.

If you do not have the prerequisites, please drop out of General Chemistry F105X immediately and enroll in Basic General Chemistry F103X. (Chemistry F103X will prepare you for Chemistry F105X.)

During the first week of laboratory (September 8 to 12), a multiple choice placement examination will be given. This exam does NOT count toward your grade. You will be given 45 minutes to answer 44 questions. The purpose of this exam is to help the student decide if he or she should remain in Chemistry F105X or drop out and take Chemistry F103X instead.

**Registration Problems:** Some students may have been placed on a waitlist or may wish to change sections. Wait-listed students should attend class and participate like any other student. If someone drops the class, then a wait-listed student can be admitted. Students on a waitlist cannot be guaranteed admittance to this class.

For any registration questions or problems, please see Mist D'June Gussak in room 194 on week days from 8:00 AM to 4:00 PM.

**Course Readings / Materials:** The required text book is: "Chemistry & Chemical Reactivity" 7$^{th}$ Ed.; J. C. Kotz, P. M. Treichel, and J. R. Townsend; Thomson - Brooks/Cole; 2009. You will need a radio frequency, hand-held clicker and an OWL PIN card. Furthermore, you will need a book entitled, "Preparing for Your ACS Examination in General Chemistry: The Official Guide" by Lucy T. Eubanks and I. Dwaine Eubanks. The text book, the clicker, the OWL PIN card, and the ACS Examination book are sold separately at the UAF book store. A limited number of copies of the ACS Examination book are available for purchase for $13 from Mist in room 194.

A recommended student solutions manual and a recommended study guide are sold separately from the text book at the UAF book store. Purchasing these manuals is optional, not required.

The lab manual, entitled "Experiments in General Chemistry 105: A Laboratory Manual", will be given to each student during the first week of laboratory (September 8 – 12).
Furthermore, a non-programmable calculator, capable of scientific notation, is also required for this course. Programmable calculators are those with graphing functions and these calculators will not be permitted for exams. If a student does not have a non-programmable calculator at the time of the exam, then the UAF student chapter of the American Chemical Society will SELL (NOT RENT) a calculator to that student for approximately $10. If a student does not have $10 at the time of the exam to buy the calculator, then we will trade the non-programmable calculator for the student's programmable calculator or the student's university ID card. These items will be returned to the student when the student gives us $10.
Batteries for clickers are sold by Mist D'June Gussak in NSF room 194. A package of 2 batteries costs $1.50.

**Clickers:** The clickers are radio frequency, NOT infrared. (On the front of the clicker, the student should see "RF" and not "IR.") When using the clicker, the student should check to see if the battery is good and should tune the clicker to channel 41. Tuning is done by: (1) pressing the "Go" button so that a light on the clicker flashes red and green; (2) pressing "41" while the light flashes; and (3) pressing the "Go" button again.
Students should label their clickers with their names and contact information in case the clicker is misplaced.
Immediately after the student has purchased a clicker, the student should report the clicker ID number to Prof. Howard by email. The clicker ID number usually consists of 6 digits (letters and numbers) and is found on the back of the clicker, under the bar code. Prof. Howard will then notify the student of his or her clicker response number by email. The clicker response number is the number that "lights up" on the overhead screen when the computer has successfully received an answer from that student.
A clicker database on a laptop will be set up outside room 194 for students to test whether their clickers are working properly or not. The student is responsible for making sure that his or her clicker works properly.

**Course Overview:** General Chemistry F105X, a 4.0 credit course, is the first semester of a two semester series in general chemistry which describes a wide variety of microscopic and macroscopic chemical phenomena. We will cover chapters 1 – 11 of the Kotz text, according to the schedule accompanying this syllabus. The topics covered in this course include (1) making scientific measurements, (2) Atomic Theory and atomic structure, (3) stoichiometry, (4) aqueous chemistry, (5) thermodynamics, (6) Valence Bond Theory and Molecular Orbital Theory, (7) introductory organic chemistry, and (8) the Ideal Gas Law. Chem F105X is a "depth" core course. Your attendance at lecture, MWF 2:15 – 3:15 PM in Reichardt 201, is expected and recorded.
General Chemistry F106X is the second-semester sequel to the Chem F105X course, and the remaining chapters (12 – 23) of the text book will be covered. At the end of Chem F106X, a standardized final examination will be given. This final examination will test for some concepts covered in Chem F105X.

**Course Goals and Student Learning Outcomes:** As a result of the General Chemistry F105X experience, students will become familiar with and practice the scientific method and learn basic skills in laboratory practices, in general chemistry, and in performing chemical calculations.

**Chem F105X Homepage:** The URL for the homepage for the chemistry courses offered at the University of Alaska Fairbanks is http://www.uaf.edu/chem/courses.htm. Select the link for the General Chemistry F105X course taught by Prof. Howard in the Fall 2008 table.
The contents of the homepage will include the syllabus and lecture schedule; practice examinations; and solutions to practice exams. Some of the materials are in ".pdf" format and require the Adobe Acrobat reader, a free plug-in.

**Instructor's Expectations of Students:** Each day BEFORE class, the student must read the portion of the text book that is assigned on the schedule of reading assignments included with this syllabus. *The student must bring the text book and the clicker to class every day.*
In class, sections of the text book will be covered by lecture, or by problem-solving. After covering a section, a quiz will be given. There will be two quizzes given per class period.
At least one week before each major examination, a practice test and an answer key will be given online. The practice test is nearly identical to the real exam, and the student is strongly encouraged to work the problems in the practice test.
Students are expected to complete their On-line Web-based Learning (OWL) homework assignments on time.

**Honors Chemistry:** The lectures for the Honors section are the same as those for all other sections. Honors students will be expected to read an approved book or study an approved topic and then to submit a written report to Professor Howard the end of the semester. The report is worth 13 points. Honors students should see Prof. Howard at the end of this first class in order to obtain the Honors assignment and to report their email addresses.

**Tentative Grade Scale:** Letter grades WITHOUT the +/- indicators will be assigned at the end of the semester. The letter grades are determined as shown in the following table.

| **Criterion** | **Maximum Point Value** |
|---|---|
| 50 quizzes | 50 x 2 points = 100 points |
| Short Exam | 50 points |
| Examination 1 | 100 points |
| Examination 2 | 100 points |
| Final Examination | 100 points |
| OWL Homework | 100 points |
| Lab Reports | 100 points |
| *(Honors Report)* | *13 points* |
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| **Total (Non-Honors Students)** | **650 points** |
| **Total (Honors Students)** | **663 points** |

| **Non-Honors Students:** | **Range of Points** | **Letter Grade** |
|---|---|---|
| | 650 – 585 | A |
| | 584 – 520 | B |
| | 519 – 455 | C |
| | 454 – 390 | D |
| | 389 or less | F |

(If you get at least 585 points, you get an "A." I may elect to set the grade cutoffs lower, but I will not set them higher.)

| **Honors Students:** | **Range of Points** | **Letter Grade** |
|---|---|---|
| | 663 – 597 | A |
| | 596 – 531 | B |
| | 530 – 464 | C |
| | 463 – 398 | D |
| | 397 or less | F |

**Quizzes:** There will be 74 quizzes given throughout the semester. Only the top 50 quiz scores will count for a grade however. Each quiz is worth 2 points, and the total quiz grade is worth 100 points. Each quiz will feature 1 multiple choice question, and the student receives one point for the correct answer, plus one point for trying. If the student gets the question wrong, the student will receive one point for trying. A quiz score of 0 (zero) means that the student did not take the quiz. All quizzes must be taken using the clicker. Excuses for NOT using the clicker – such as "I forgot my clicker" or "my clicker is not working right now" – will NOT be accepted.

**Examinations:** One short exam, two major exams, and a final exam will be given. The short exam will cover only the first two chapters of the textbook, and this exam is meant to acquaint students with the style of the tests and to serve as an indicator of how well the student is preparing for the exams. The short exam is worth only 50 points, while the two major exams and the final exam are worth 100 points each. The first major exam will cover chapters 1 through 5; the second major exam will cover chapters 6 through 10 and Interchapter 2 only. The final exam is cumulative and covers chapters 1 through 11 and the Interchapter 2. The final exam will be a standardized multiple-choice exam, prepared by the American Chemical Society.

Make-up exams will be allowed for good reasons. If you can anticipate an absence (work commitments, intercollegiate sports, etc.), talk to Professor Howard ***before*** the exam to make arrangements. If the absence is unexpected (illness, family or personal difficulties, cold weather transportation), talk with your professor at the earliest possible opportunity. Please reschedule an exam if you are ill. If you are to take a makeup exam, we expect that you have no substantial knowledge of the content of the original exam. If you have

found out about the exam content, you are obligated to tell this to your professor well before the scheduled time of the makeup exam.

**OWL Homework:** Homework problems will be done using the OWL (On-line Web-based Learning) system, developed at the University of Massachusetts Amherst. The student can purchase an OWL PIN card from the UAF book store, either in the package with the text book or separately. After obtaining an OWL PIN, go to the homepage for this course. Click on the link for the OWL homework. Then, click on "general" under Instructor / Student login, and you will see a page with some text books listed. Click on your text book, and you will see a list of schools that use this book and the OWL system. Click on the UAF link. For the first time, click on "student registration" and follow the directions. When normally using OWL, click on "User login page" and follow the directions.
Please remember your OWL login and password. Write them down somewhere and do NOT forget them!
Students will have 5 chances to get each OWL problem correct. Also, each student will be given five extensions for the homework due date, regardless of the reason for not completing the homework on time. The student should notify Professor Howard as soon as possible by email or telephone in order to get the homework extension.
All OWL homework assignments are due at 9:01 PM Alaska time, and the due dates for the various assignments are shown on the Schedule appended to this syllabus.
When the student has completed a section of OWL correctly, the student will see a green check mark and OWL will indicate that the student has completed "1 of 1" or "2 of 2" or "2 of 3" etc. At the end of the semester, the total OWL points are summed, divided by the number of possible points, and multiplied by 100% to calculate the OWL score. A sample OWL grade calculation is given:

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|---|---|---|
| OWL Section 1-1 | √ | 1 of 1 |
| OWL Section 1-2 | √ | 2 of 2 |
| OWL Section 1-3 | √ | 2 of 3 |

Total OWL score = (5 ÷ 6) x 100 = 83.3

**Extra Credit OWL Problems:** Some of the OWL homework problems are required, but some are for extra credit. (OWL lists which problems are required and which are extra credit.) The maximum number of points for OWL extra credit is 8. The extra credit is calculated in the following way: The points for the extra credit OWL problems are summed and divided by the total number of possible points; this ratio is then multiplied by 8 points to give the final extra credit score.

**Supplemental Instruction:** Each week, Mr. Robert Gorsline, a former Chemistry F105X student, will conduct an out-of-class learning session called supplemental instruction. Although attendance is voluntary, attendance will be recorded and reported to Prof. Howard. The purpose of supplemental instruction is to re-inforce the concepts covered in lecture by allowing each student to teach others. The most effective way to learn something is to teach it to others. More details on the supplemental instruction will be given in class by Prof. Howard.

**Laboratory:** The purpose of the lab is to do hands-on investigation. We expect you to gain skills in scientific reasoning, experimental design, and use of chemicals and laboratory apparatus. The labs are conducted by graduate and upper division undergraduate teaching assistants who will have specific office hours. Lab reports will be handed in each week, to be graded and returned by the teaching assistant. Eleven experiments are scheduled for the semester. The laboratory portion of your grade (100 points) will be based upon the average of your best ten lab grades.
*All students enrolled in Chem F105X must attend laboratory*. Students completing reports for fewer than eight labs will fail the course, even if they have passing exam grades. You must attend lab prior to writing a lab report! There are no make-up labs scheduled during the semester. If you have special scheduling problems or if you miss more than one lab for an acceptable reason, please discuss alternative plans with Professor Howard.
Laboratory reports are due one week after a lab is completed. Reports will be accepted up to one week late, but they will earn only 75% of the assigned grade. Reports turned in more than one week late will not be accepted. The last report of the semester will not be accepted late.
No lab work will be carried out during the first week of class. Rather, a placement exam will be given. The first lab work occurs during the second week of class and includes a safety review. STUDENTS MUST TAKE THE PLACEMENT EXAM AND ATTEND THE SAFETY REVIEW IN ORDER TO STAY IN THIS COURSE!
Please see the portion of the UAF Honor Code reproduced in the "Ethical Considerations" section below. Do not believe any rumors that it is acceptable to make up data or to use the work of another student (other than a lab partner in a collaborative experiment) as the basis of a lab report.

**Lab Cleanup:** The last portion of each day (approximately 20 minutes) in the laboratory will be devoted to lab cleanup. Students are responsible for the cleanliness of their own bench area, all used glassware, the balance area, trash cans, and desktops. Students are also responsible for thoroughly labeling all materials generated in lab. Points will be deducted from a student's lab grade for failing to keep his or her area clean. The point deduction is left to the discretion of the TA.

**Help:** Extra help is available, in case the student is having difficulty with Chem F105X. The student may make an appointment to see Prof. Howard for help. Or, the Chemistry Department offers free tutoring services, and the student may see a tutor for help. The student may see any lab TA for help during the TA's office hours.
Also, the supplemental instruction sessions (vide supra) are meant as a source of extra help for the student.
After the second week of classes, Prof. Howard will identify those students who are not making adequate progress on the OWL homework and the clicker quizzes. Those students will be contacted by Prof. Howard, and Prof. Howard will also notify the students' academic advisors.

**More Extra Credit and End-of-the-Semester ACS Post-Test:** In addition to the extra credit OWL problems, there will be two more opportunities to earn extra credit

throughout the semester. First, Dr. R. Bruce King, a professor of inorganic chemistry from the University of Georgia, will visit UAF on Monday, September 15, 2008. A student may earn 1 extra credit point by attending Dr. King's seminar.
Second, a standardized, multiple-choice examination will be given during the final week of lab, and all students will be required to take this examination. The purpose of this examination is to assess how much material the student has learned and retained after taking this course. The student's score on this exam is NOT counted toward the grade, but some extra credit points will be given. For instance, if the student's score is above 90%, 4 extra credit points will be given; if the score is between 80 and 90%, 3 extra credit points will be given; and if the score is between 70 and 80%, 2 extra credit points will be given. All students will receive at least one extra credit point, regardless of the score, for taking this exam.

**Ethical Considerations:** The Chemistry "Department Policy on Cheating" is this: *"Any student caught cheating will be assigned a course grade of F. The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course."*
Some examples of cheating include, but is not limited to, the following: (1) using another student's clicker; (2) using cell phones during exams or quizzes; (3) plagiarism; (4) using programmable calculators during exams; (5) copying another student's answer while taking an exam or a quiz; and (6) unauthorized collaborations on lab projects. During exams and quizzes, electronic devices such as pagers, mp3 players, Ipods, earbuds, text messengers, gameboys, etc. must be turned off.
If you misplace your clicker, immediately notify Professor Howard. You must buy a new clicker. Using another student's clicker is strictly prohibited. If a student is caught using another student's clicker, both the borrower and the lender will be considered cheaters and will be subjected to the policies on cheating.
As a UAF student, you are subject to UAF's Honor Code:
*"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.*
*Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses, and other reports.*
*No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.*
*Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."*

**Disabilities:** Students with a physical or learning disability are required to identify themselves to Mary Matthews (x 7043) in the Disability Services office, located in the Center for Health and Counseling. The student must provide documentation of the disability. Disability Services will then notify Prof. Howard of special arrangements for taking tests, working homework assignments, and doing lab work.

**Instructor Withdrawals:** The instructor reserves the right to withdraw any student from class for any of the following reasons:

(1) The student has missed Exam 1 without an excused absence;
(2) The student has missed more than three labs;
(3) The student appears to be failing as of October 31, the last day for instructor withdrawal.

**Freshman Progress Reports:** Freshman progress reports will be based on the short exam, the quiz scores, and the OWL homework scores, up to and including October 8.

**Incompletes:** A grade of "incomplete" is assigned only when a student misses the final exam for a very good reason, such as a medical problem, a death in the family, etc.

**Important Dates:**

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| • Last day to drop class with 100% refund | Sept. 12 |
| • Last day for withdrawals with class not appearing on record | Sept. 19 |
| • Last day to drop class with 50% refund | Sept. 19 |
| • Freshman Progress Reports due | Oct. 10 |
| • Last day for withdrawals with student receiving "W" | Oct. 31 |
| • Thanksgiving Break | Nov. 27 – 30 |
| • Last day of class | Dec. 12 |

See academic calendar on inside cover of Fall 2008 Class Schedule for more important dates.

General Chemistry F105X Schedule

Professor Howard Fall 2008 Semester

| Week No. | Dates | Reading Assignments | Classroom Activity | OWL Due? | Lab Experiment |
|---|---|---|---|---|---|
| 1 | Sept. 5 | None | Introduction to Course and to Chemistry. | | None |
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| 2 | Sept. 8 | Pages 1 to 19. | Cover Chapter 1. 2 quizzes. | Intro to OWL, Math | Standardized Pretest |
| | Sept. 10 | Pages 24 to 38. | Units, Accuracy and Precision, Sig. Figures. 2 quizzes. | OWL Chapter 1 | **Attendance Mandatory!** |
| | Sept. 12 | Pages 38 to 42. | Math with sig. figures, Dimensional analysis. 2 quizzes. | Let's Review 1b, 3d, 3e | |
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| 3 | Sept. 15 | Pages 50 to 58. | Cover Sections 2.1 to 2.4. 2 quizzes. | Let's Review 3f, 3i, 3k | Chemical Health and Safety |
| | Sept. 17 | Pages 58 to 70. | Cover Sections 2.5 and 2.6. 2 quizzes. | 2.2a, 2.2c, 2.3a, 2.4b | **Attendance Mandatory!** |
| | Sept. 19 | Pages 70 to 82. | Cover Sections 2.7 and 2.8. 2 quizzes. | 2.5b, 2.5c, 2.6c | |
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| 4 | Sept. 22 | Pages 82 to 98. | Cover Sections 2.9 to 2.11. 2 quizzes. | 2.7(defhjk), 2.8(bc) | |
| | Sept. 24 | | **Short Test** | 2.9(dgh), 2.10 (bf), 2.11b | Intro to Lab Techniques |
| | Sept. 26 | Pages 112 to 122. | Cover Sections 3.1 to 3.4. 2 quizzes. | | |
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| 5 | Sept. 29 | Pages 122 to 131. | Cover Sections 3.5 and 3.6. 2 quizzes. | 3.1, 3.2d, 3.3a, 3.4 | |
| | Oct. 1 | Pages 131 to 141. | Cover Sections 3.7 and 3.8. 2 quizzes. | 3.5(cf), 3.6(befg) | Identification of an Unknown Substance |
| | Oct. 3 | Pages 141 to 151. | Cover Sections 3.9 and 3.10. 2 quizzes. | 3.7(acde), 3.8 | |
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| 6 | Oct. 6 | Pages 158 to 169. | Cover Sections 4.1 to 4.3. 2 quizzes. | 3.9b | |
| | Oct. 8 | Pages 169 to 179. | Cover Sections 4.4 and 4.5. 2 quizzes. | 4.1(ac), 4.2(df), 4.3b | Intro to Aqueous Chemistry |
| | Oct. 10 | Pages 179 to 193. | Cover Sections 4.6 to 4.8. 2 quizzes. | 4.4c, 4.5(eh) | |
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| 7 | Oct. 13 | Pages 208 to 222. | Cover Sections 5.1 to 5.3. 2 quizzes. | 4.7(gh) | |
| | Oct. 15 | Pages 222 to 233. | Cover Sections 5.4 to 5.6. 2 quizzes. | 5.2e, 5.3(bd) | Copper Cycle |
| | Oct. 17 | Pages 233 to 240. | Cover Sections 5.7 and 5.8. 2 quizzes. | 5.4c, 5.5(ac), 5.6(bd) | |
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| 8 | Oct. 20 | | **Exam 1** | 5.7(bd) | |
| | Oct. 22 | Pages 268 to 275. | Cover Sections 6.1 and 6.2. 2 quizzes. | | Enthalpy of Neutralization |
| | Oct. 24 | Pages 275 to 283. | Cover Sections 6.3 and 6.4. 2 quizzes. | 6.1(be), 6.2d | |
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| 9 | Oct. 27 | Pages 283 to 296. | Cover Sections 6.5 to 6.7. 2 quizzes. | 6.3(ce), 6.4b | |
| | Oct. 29 | Pages 304 to 309. | Cover Sections 7.1 and 7.2. 2 quizzes. | 6.5c, 6.6b, 6.7b | Intro to Spectroscopy |
| | Oct. 31 | Pages 309 to 318. | Cover Sections 7.3 and 7.4. 2 quizzes. | 7.1, 7.2b | |
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| 10 | Nov. 3 | Pages 319 to 330. | Cover Sections 7.5 and 7.6. 2 quizzes. | 7.3(egh), 7.4(ce) | |
| | Nov. 5 | Pages 339 to 347. | Atomic Theory and Structure. 2 quizzes. | 7.5(bei) | Spectroscopy and Water Hardness |
| | Nov. 7 | Pages 348 to 360. | Cover Sections 8.1 to 8.3. 2 quizzes. | IC 2.1 | |
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| 11 | Nov. 10 | Pages 361 to 367. | Cover Sections 8.4 and 8.5. 2 quizzes. | 8.2a, 8.3(bc) | Isotopes and GC Mass Spec |
| | Nov. 12 | Pages 367 to 386. | Cover Sections 8.6 to 8.8. 2 quizzes. | 8.4b, 8.5(bd) | |
| | Nov. 14 | Pages 386 to 394. | Cover Sections 8.9 and 8.10. 2 quizzes. | 8.6(abf), 8.7, 8.8b | |
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| 12 | Nov. 17 | Pages 404 to 422. | Cover Sections 9.1 and 9.2. 2 quizzes. | 8.9(ac) | Computational Chemistry Using |
| | Nov. 19 | Pages 422 to 433. | Cover Section 9.3. 1 quiz. | 9.2(fgho) | HyperChem |
| | Nov. 21 | | Molecular Orbital Theory Practice. 1 quiz. | 9.3(df) | |
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| 13 | Nov. 24 | Pages 442 to 453. | Cover Sections 10.1 and part of 10.2. 2 quizzes. | | |
| | Nov. 26 | Pages 453 to 461. | Cover Remainder of Section 10.2. 2 quizzes. | 10.1(cd), 10.2(acd) | **NO LAB** |
| | Nov. 28 | | **NO CLASS – HAPPY THANKSGIVING!** | | |
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| 14 | Dec. 1 | Pages 461 to 468. | Cover Section 10.3. 2 quizzes. | 10.2(egjlm) | |
| | Dec. 3 | Pages 468 to 488. | Cover Sections 10.4 and 10.5. 2 quizzes. | 10.3(acdfgh) | Gas Laws |
| | Dec. 5 | | **Exam 2** | 10.4(cefghijkmn), 10.5(acd) | |
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| 15 | Dec. 8 | Pages 514 to 530. | Cover Sections 11.1 to 11.4. 2 quizzes. | | |
| | Dec. 10 | Pages 530 to 537. | Cover Sections 11.5 and 11.6. 2 quizzes. | 11.1, 11.2e, 11.3(bf), 11.4b | Standardized Post-test |
| | Dec. 12 | Pages 538 to 547. | Cover Sections 11.7 to 11.9. 2 quizzes. | 11.5c, 11.6e | **Attendance Mandatory!** |
| | Dec. 16 | | | 11.7c, 11.9 | |
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| 16 | Dec. 17 | 1:00 to 3:00 PM | **Final Exam** | | |