CHEMISTRY 105 – FUNDAMENTALS OF CHEMISTRY:

Introduction to Molecular Science

Fall 2008, Section B

“...the role of a teacher is to inspire students to teach themselves.”
Qtd. in “Toward Better Teaching,” Award Address; Dennis G. Peters, 2001—American Chemical Society Northeast Section Teaching Award Recipient

Instructor Information:

Lecture:
Dr. K. A. Kneas
Office: Musser 224
Phone: 361-1129
Office Hours: ../k/kneask/Kneas_Schedule.htm
E-mail: kneask@etown.edu
Web: http://users.etown.edu/k/kneask/

Laboratory (in addition to Dr. Kneas):
Dr. C. D. Schaeffer
Office: Musser 208
Phone: 361-1128
E-mail: schaeffercd@etown.edu

Ms. L. Ebright
Office: Musser 105
Phone: 361-1126
E-mail: ebrightl@etown.edu

Course Description:

An introduction to the study of the material world from a conceptual, model-building viewpoint. Topics include: elements and compounds, atomic composition and electronic structure, bonding and molecular structure, physical properties, thermodynamics, and reaction kinetics.

Course Objectives:

CH105 is designed to

• demonstrate that chemistry pervades our lives and to impress upon you the importance of an understanding of chemical concepts and methods of scientific research
• foster your understanding of fundamental chemical concepts in the context of “real world” applications
• help you build confidence in your ability to critically analyze science and to apply the chemical concepts that you learn
• afford you an opportunity to actively participate in the learning process (i.e., by reading and discussing the textbook, completing practice exercises, engaging in class sessions, performing laboratory exercises, asking questions, and seeking answers)

Course Prerequisites: High School Chemistry and High School Algebra
Course Materials:

For Lecture
- *Chemistry: The Molecular Science, 3rd Edition* by Moore, Stanitski, and Jurs
- OWL for General Chemistry Student Access Card
- Non-programmable, Scientific Calculator such as Casio fx-300MS or Texas Instruments TI-30XA

For Lab
- *A Manual for General Chemistry Laboratory* (5th Ed.) by Reeder, Schaeffer, and Hedrick
- Additional Laboratory Handouts (provided)
- Bound Laboratory Notebook (minimum of 60 pages), quadrille ruled
- Safety Goggles

Class Meetings:
Lecture: ST 114; M,W,F; 9:30-10:20 AM
Laboratory: Musser 108; M/T/W/H 12:30-3:30 PM or 8:00-11:00
Optional Demonstration, Problem-Solving, and Review Sessions TBA

Course Evaluation:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Problem Sets (15)</td>
<td>8%</td>
</tr>
<tr>
<td>Quizzes (6)¹</td>
<td>12.5%</td>
</tr>
<tr>
<td>Examinations (3)</td>
<td>42%</td>
</tr>
<tr>
<td>Laboratory Exercises²</td>
<td>12.5%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>25%</td>
</tr>
<tr>
<td>Additional Opportunities for Learning (AOLs)³</td>
<td>100%</td>
</tr>
</tbody>
</table>

¹ Seven quizzes will be proctored; the lowest quiz grade will be dropped.
² See daily syllabus for specific exercises.
³ Up to 1.5% earned through AOLs is applied to the final course grade.

Problem Sets: For each chapter, assigned and suggested problems that reinforce concepts covered in lecture will be indicated. Suggested problems, generally similar to the assigned problems, may be worked with assistance from classmates, tutors, and the instructor. Assigned problems will be evaluated and *must be worked individually*. Discussing assigned problems with anyone other than the instructor constitutes cheating.

Assigned problems will be posted by the instructor, and your answers will be submitted using OWL (WWW) by 8:00 AM on the day that they are due. You are strongly encouraged to retain a hard copy of your written work for purposes of study and review. Late problem sets are not accepted.

As concepts are covered during lecture, the instructor will indicate which of the suggested and assigned problems are related. You are *strongly* encouraged to work problems as the material is covered in lecture to prevent panic and frustration on the night before a quiz or exam or before a problem set is due. Please see the additional problem-solving suggestions in the “Suggested Approach to Course Preparation” handout that is available on Blackboard.

Quizzes: Seven quizzes consisting of several questions or problems and requiring roughly 10 minutes to complete will be proctored to assess your retention of material covered previously. These quizzes will provide an opportunity for you to recognize any weaknesses and uncertainties prior to the major examinations.
Examinations: Three exams proctored during the semester will test your understanding of material covered in lecture, problem sets, the laboratory, and your reading. While each exam will be focused on the most recent topics of study, it should be noted that chemistry is a cumulative science; \textit{i.e.}, new material builds on what you have learned previously. For this reason, it is imperative that you stay current with assignments and that you seek assistance if you have difficulty in grasping a particular concept.

Laboratory Exercises: The laboratory experience is detailed in your manual and in separate handouts provided by the laboratory instructors. Attendance is mandatory, and \textit{the penalty for incomplete laboratory work is failure of the course.}

Final Examination: Your final examination is cumulative and will test your understanding of chemical concepts that are covered during the semester.

Additional Opportunities for Learning (AOLs): Throughout the semester, there will be opportunities outside of lecture and laboratory sessions for you to demonstrate your commitment to teaching chemistry to yourself and others. Opportunities for which points may be awarded will be announced and may include your attendance at chemistry seminars and meetings, your assistance during course study and review sessions, your completion of challenging problems or questions posed during lecture or laboratory, and your study of additional topics in chemistry. A record of your accumulated points will be kept, and these points will be applied to raise your final course grade by up to 1.5 percentage points. Please note that \textit{failure to accumulate points does not result in a lowering of your course grade.}

Grading Scale:* 

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>97-100</td>
</tr>
<tr>
<td>A</td>
<td>93-96</td>
</tr>
<tr>
<td>A-</td>
<td>90-89</td>
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<tr>
<td>B+</td>
<td>87-86</td>
</tr>
<tr>
<td>B</td>
<td>83-82</td>
</tr>
<tr>
<td>B-</td>
<td>80-79</td>
</tr>
<tr>
<td>C+</td>
<td>77-76</td>
</tr>
<tr>
<td>C</td>
<td>73-72</td>
</tr>
<tr>
<td>C-</td>
<td>70-69</td>
</tr>
<tr>
<td>D+</td>
<td>67-66</td>
</tr>
<tr>
<td>D</td>
<td>63-62</td>
</tr>
<tr>
<td>D-</td>
<td>60-59</td>
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<tr>
<td>F</td>
<td>0-59</td>
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</tbody>
</table>

*Letter grades earned on individual assignments, examinations, \textit{etc.} may be higher for a given percentage than indicated on this scale. In such a case, a conversion to the scale shown here will be indicated.

Additional Opportunities for Teaching and Learning:

Office Hours: I wish to be as accessible and helpful to you as possible while maintaining a high level of quality in my instruction. To this end, I uphold an Open Door Policy; \textit{i.e.}, you are welcome to stop by my office with questions during my regularly scheduled office hours and when my office door is open. You are always welcome to schedule an appointment, should you have difficulty catching me at a time that is convenient for you.

Student-Led Problem-Solving Sessions: (Days and times TBA) Tutors will be available to help you work the suggested chapter problems. Additionally, you are \textit{strongly} encouraged to help one another work the suggested problems during these and other times.

Instructor-Led Problem-Solving and Exam Review Sessions: (Dates and times TBA) I will be available to answer questions related to concepts covered during lecture and laboratory and to help you work past lecture examples, suggested chapter problems, and additional example problems.

Suggested Approach to Course Preparation: Students often ask how best to approach my courses in order to optimize learning and performance. Please see the handout available on Blackboard that details a recommended strategy for CH105.
Additional Information:

**Academic Integrity Policy:** Please familiarize yourself with Elizabethtown College’s Pledge of Integrity and with the academic judicial system as described in the student handbook and college catalog. Violations of the academic integrity policy will not be tolerated. They will be handled according to the procedures outlined in the student handbook and college catalog.

**Make-up Quiz, Examination, and Laboratory Policy:** Make-up quizzes are not offered; the lowest quiz score is dropped. Make-up exams and laboratory exercises are offered only under extreme circumstances and with prior permission from the instructor(s). Unless otherwise indicated, make-up exams are completed during the last week of classes, and make-up laboratory exercises are completed during a time that is suitable to the laboratory instructor. Unexcused absences from exams, quizzes, and laboratory exercises result in a grade of F (0%).

**Accommodations:** If you have a documented disability and need reasonable accommodations to fully participate in course activities or meet course requirements, you must

1) contact the Coordinator of Learning Services and Disability Services, Tamera Longsderff, in the Center of Student Success, BSC 226, (717) 361-1549, longsdtl@etown.edu, AND

2) meet with me, the instructor, within two weeks of receiving a copy of the accommodation letter from Disability Services to discuss your accommodation needs and their implementation.

**Student Advisory Committee:** Three or four volunteers will be solicited to serve on a Student Advisory Committee for the course. The primary role of the committee, which will meet with me several times during the semester, is to serve as a “sounding board” for student comments, suggestions, and concerns. Open lines of communication will help facilitate the development of a healthy teaching and learning environment. For your own record, list the names and contact information for members of your Student Advisory Committee:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

**Classroom Etiquette:** As a class, you will establish a list of guidelines to assure that a non-disruptive and positive learning environment is maintained. The Student Advisory Committee will provide me with a list of guidelines to which you agree to adhere. For your own record, list the guidelines here:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
Attendance Policy: As a class, you will establish an attendance policy that will help you to attain the goals that you have set for yourselves in this course. The Student Advisory Committee will inform me of the class decision, and on Wed., Sept. 3, I will begin to enforce the policy that you establish. For your own record, note the policy here:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Fall 2008, Tentative Schedule*

- **M 8/25**
  - Chapter 1: The Nature and Study of Chemistry
  - **Laboratory Exercise**: Mathematics of Chemistry (Exp. 1)

- **W 8/27**
  - Chapters 1 & 2: The Study of Chemistry

- **F 8/29**
  - Chapter 2: **Problem Set 1 DUE**, Elements & Compounds, Numerical Data Reporting

- **M 9/1**
  - No Class—Labor Day
  - **Laboratory Exercise**: Mathematics of Chemistry (Exp. 1)

- **W 9/3**
  - Chapter 2: **Quiz 1**, Numerical Data Reporting and Problem Solving

- **F 9/5**
  - Chapter 2: **Problem Set 2 DUE**, Atomic Theory, Structure & Properties of the Atom

- **M 9/8**
  - Chapter 3: The Periodic Table, Chemical Formulas and Nomenclature

- **W 9/10**
  - Chapter 3: **Quiz 2**, Chemical Formulas and Nomenclature

- **F 9/12**
  - Chapter 3: **Problem Set 3 DUE**, Mass Relationships, Moles, Molar Mass

- **M 9/15**
  - Chapter 3, 4: Percent Composition, Empirical and Molecular Formulas

- **W 9/17**
  - Chapter 4: **Laboratory Exercise**: Empirical Formula of Magnesium Oxide (Exp. 5)

- **F 9/19**
  - Chapter 4: **Problem Set 4 DUE**, Chemical Equations, Reaction Stoichiometry

- **EXAM 1**

- **M 9/22**
  - Chapter 4: Reaction Stoichiometry, Limiting Reagents, Percent Yield
Laboratory Exercise Qualitative Inorganic Analysis (Blue Book)

W 9/24 Chapter 5 Types of Reactions, Exchange Reactions—Precipitation

F 9/26 Chapter 5 Problem Set 5 DUE, Exchange Reactions—Acid-Base, Gas-forming Reactions

M 9/29 Chapter 5 Oxidation-Reduction Reactions

Laboratory Exercise Qualitative Inorganic Analysis (Blue Book)

W 10/1 Chapter 5 Quiz 3, Solution Concentrations and Titrations

F 10/3 Chapter 7 Problem Set 6 DUE, Introduction to Quantum Theory, Orbitals

M 10/6 Chapter 7 Quantum Theory

No Laboratory Exercise—Fall Break

W 10/8 Chapter 7 Problem Set 7 DUE, Electron Configurations

F 10/10 No Class—Fall Break

M 10/13 Chapter 7 Periodic Trends

Laboratory Exercise Qualitative Inorganic Analysis (Blue Book)

W 10/15 Chapter 8 Quiz 4, Covalent Bonds & Lewis Dot Structures

F 10/17 Chapters 8 Problem Set 8 DUE, Bond Properties

M 10/20 Chapter 8 Resonance Structures

Laboratory Exercise Qualitative Inorganic Analysis (Blue Book)

W 10/22 Chapter 9 Problem Set 9 DUE, VSEPR Theory

F 10/24 EXAM 2

M 10/27 Chapter 9 Valence Bond Theory

Laboratory Exercise Qualitative Inorganic Analysis (Blue Book)

W 10/29 Chapter 9 Molecular Polarity

F 10/31 Chapter 10 Problem Set 10 DUE, Properties of Gases
<table>
<thead>
<tr>
<th>Date</th>
<th>Section</th>
<th>Topic/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 11/3</td>
<td>Chapter 10</td>
<td>Kinetic Molecular Theory</td>
</tr>
<tr>
<td></td>
<td><strong>Laboratory Exercise</strong></td>
<td>Volumetric Determination of Calcium in Bottled Water (Handout)</td>
</tr>
<tr>
<td>W 11/5</td>
<td>Chapter 10</td>
<td><strong>Quiz 5.</strong> Ideal Gas Laws</td>
</tr>
<tr>
<td>F 11/7</td>
<td>Chapters 11 &amp; 15</td>
<td><strong>Problem Set 11 DUE,</strong> Intermolecular Forces</td>
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<tr>
<td>M 11/10</td>
<td>Chapter 11</td>
<td>Properties of Liquids, Solids, and Materials</td>
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<td></td>
<td><strong>Laboratory Exercise</strong></td>
<td>Gravimetric Determination of Nickel in a Coin (Handout); Introduction to Organic Structure (Exp. 18)</td>
</tr>
<tr>
<td>W 11/12</td>
<td>Chapter 15</td>
<td><strong>Quiz 6.</strong> Properties of Solutions</td>
</tr>
<tr>
<td>F 11/14</td>
<td>Chapter 15</td>
<td><strong>Problem Set 12 DUE,</strong> Properties of Solutions</td>
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<tr>
<td>M 11/17</td>
<td>Chapter 14</td>
<td>Chemical Equilibrium</td>
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<tr>
<td></td>
<td><strong>Laboratory Exercise</strong></td>
<td>Gravimetric Determination of Nickel in a Coin (Handout); Introduction to Organic Structure (Exp. 18)</td>
</tr>
<tr>
<td>W 11/19</td>
<td>Chapter 14</td>
<td><strong>Problem Set 13 DUE,</strong> Chemical Equilibrium</td>
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<tr>
<td>F 11/21</td>
<td></td>
<td><strong>EXAM 3</strong></td>
</tr>
<tr>
<td>M 11/24</td>
<td>Chapter 14</td>
<td>Chemical Equilibrium</td>
</tr>
<tr>
<td></td>
<td><strong>Laboratory Exercise</strong></td>
<td>Gravimetric Determination of Nickel in a Coin—Weigh Crucibles</td>
</tr>
<tr>
<td>W 11/26</td>
<td>Chapter 16</td>
<td><strong>Problem Set 14 DUE,</strong> Introduction to Acids and Bases</td>
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<tr>
<td>X F 11/28</td>
<td></td>
<td><strong>No Class—Thanksgiving Break</strong></td>
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<tr>
<td>M 12/1</td>
<td>Chapter 16</td>
<td>pH Scale, Acid-Base Equilibria</td>
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<tr>
<td></td>
<td><strong>Laboratory Exercise</strong></td>
<td>Check-Out</td>
</tr>
<tr>
<td>W 12/3</td>
<td>Chapter 16</td>
<td><strong>Quiz 7.</strong> Acid-Base Equilibria</td>
</tr>
<tr>
<td>F 12/5</td>
<td>Chapter 17</td>
<td><strong>Problem Set 15 DUE,</strong> Buffers</td>
</tr>
<tr>
<td>M 12/8</td>
<td></td>
<td><strong>FINAL EXAM</strong> (7:30-10:30 AM)</td>
</tr>
</tbody>
</table>

*Subject to Change Depending on Time Constraints and Needs of the Class. Periodic updates will be posted on course Blackboard site.

**Reminder:** The penalty for any incomplete laboratory work remaining after 2:00 PM on Friday, December 5, 2008 is failure of the course.