PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

CONCEPTS OF CHEMISTRY
CHEM 1310

Class Hours: 3.0                Credit Hours: 3.0
Laboratory Hours: 2.0                Revised: Fall 06

Catalog Course Description:

Composition of matter, atomic structure, bonding, gas laws, liquid and solid states, solutions, acids and bases, chemical reactions, nuclear chemistry & technology, polymers, household chemistry, and introduction to environmental & organic/medicinal chemistry. Course includes three hours of lecture/lab and three hours of laboratory applications each week.

Entry Level Standards:

Two years of high school algebra or one year of high school algebra and one year of high school geometry are necessary for entrance to the course. This course is intended for non-science and non-pre-professional students who are considering a career in education. Must be able to read and write at the college level.

Prerequisites:

Two years of high school algebra and completion of DSP math requirements; must be able to read at the college level.

Textbook(s) and Other Course Materials:


Lab Manual: There is no lab manual for this course. All labs and activities will be provided either in hardcopy format or via download from WebCT.

Ancillary Materials: Scientific Calculator (get a cheap one from Wal Mart, etc.)

WebCT Access: This course will be a “Web Enhanced” course utilizing WebCT. Point your Web Browser to [http://www.pstcc.edu/ets/dist_learn/online.html](http://www.pstcc.edu/ets/dist_learn/online.html) to Log-On. This webpage will be used for distribution of assignments, handouts, links to Web-based assignments and databases, and other information as the semester progresses. Check the site frequently for new items and info! In addition, there are online resources for out textbook available at [www.aw.com/chemplace](http://www.aw.com/chemplace).

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to the course; Chemistry Is a Science; Properties of Matter [Chap. 1]; Arithmetic of Chemistry [Chaps. 1]</td>
</tr>
<tr>
<td>2</td>
<td>Atoms and Atomic Structure [Chap. 2-5]</td>
</tr>
<tr>
<td>3</td>
<td>Nuclear Chemistry &amp; Technology and Impact on Society [Chap. 4-5]</td>
</tr>
</tbody>
</table>
II. Course Objectives*:

A. Understand the fundamental concepts of atomic structure, molecular structure, and bonding. V.1, 3, 4; VII.1

B. Predict properties of elements from the periodic table based on an acquired knowledge of periodic law. V.1, 2, 3, 4, 5

C. Apply the laws of chemistry and utilize the necessary mathematics to solve problems in chemical relationships. V.1, 2, 3, 4, 5; VI.2, 6

D. Understand the fundamental concepts of kinetic molecular theory. V.1, 2, 3, 4

E. Demonstrate knowledge of the nature and behavior of electrolytes. V.1, 2, 3, 4

F. Identify nuclear particles, balance nuclear equations, and distinguish between nuclear fission and fusion. V.1, 2, 3, 4, 5

*Roman numerals after course objectives reference TBR’s general education goals.

III. Instructional Processes*:

Students will:

1. Demonstrate problem-solving ability with emphasis on chemical word problems and perform mathematical calculations. Natural Sciences Outcome, Mathematics Outcome

2. Use appropriate methods and equipment for making chemical observation and measurements in a laboratory setting. Technological Literacy Outcome, Active Learning Strategies

3. Collect data, generate and interpret chemical laboratory data using appropriate computer technology and/or software. Technological Literacy Outcome, Natural Science Outcome, Active Learning Strategy

4. Locate, read, and interpret scientific information in printed media. Technological Literacy Outcome, Natural Sciences Outcome, Communication Outcome

5. Learn and use chemical terms, name chemical compounds, understand and predict chemical behaviors. Natural Sciences Outcome

6. Understand and communicate the relevance of chemistry to their chosen field of work and society in general. Transitional Strategies, Active Learning Strategies

7. Correlate laboratory observations with theoretical concepts presented in class. Natural
8. Read, analyze, and evaluate scientific writings and experimental procedures. Natural Sciences Outcome, Technological Literacy Outcome, Communication Outcome

9. Collect, organize, interpret, and publically present information concerning scientific events, subjects in society, and knowledge to students at PSTCC, and possibly in the community. Communication Outcome, Transitional Strategies, Active Learning Strategies

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*

Upon successful completion of this course, the student should be able to:

1. Perform mathematical calculations pertaining to unit conversions, significant figures, quantitative chemical relationships, density, solution concentrations, dilutions, pH and pOH, hydronium and hydroxide ion concentrations, titrations, half-life of radioactive isotopes, gas laws, colligative properties. C

2. Understand the fundamental chemical concepts including atoms, subatomic particles, formation of ions, moles, molecules. A

3. Draw/build Lewis structures for the elements and compounds predict shape and polarity of covalent compounds. A, B, C

4. Determine oxidation numbers, name compounds and write their formulas. A, C

5. Label bond type(s) for an element or compound and describe molecular type. A, D

6. Classify chemical reactions. A, C

7. Understand and recognize electrolytes and understand their behavior. A, B, E

8. Understand kinetic molecular theory and how it relates to gases, liquids, and solids. D

9. Understand the dissolution process and colligative properties. A, D, E

10. Understand and recognize the different acid-base theories, distinguish between strong vs. weak acids and bases and understand their reactions, and understand buffer solutions. A, B, C

11. Identify nuclear particles and balance nuclear reactions. C, F

12. Understand radioactive decay of a nuclide and determine its rate of decay and half-life. A, F

13. Distinguish between nuclear fusion and fission. F

14. Develop an understanding of the scientific method and applications in chemistry and in everyday life. A

15. Classify and identify the types of polymers and other synthetic materials. A
16. Identify components and describe major environmental factors and processes that are ongoing on our planet. A, B, C, G

17. Understand and evaluate the chemical principles being utilized in the household and medicinal chemistry areas. A, G

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 45% of grade

Unit tests: 30%
FOUR (4) tests will be given. One test may be dropped. There are NO MAKEUP Tests.
Tests will be multiple choice, short answer, fill-in-the-blank, but mainly discussion/problem solving.
Comprehensive final exam: 15%
All students are required to take the final exam in order to receive credit for the course.

B. Laboratory Expectations: 40% of grade

1. Attendance is required for scheduled course meetings. There are NO MAKEUP Lab sessions. Students may drop the one, lowest (15 pt labs) lab grade of the semester.
NOTE: if a student misses more than four lab sessions, the student receives an F for the course regardless of the grade for the lecture portion. Lab report sheets must be completed in INK. Contact lenses may not be worn in the laboratory.

2. A comprehensive lab final will be given on the last day of lab, worth 5% of grade. This will consist of presentations of student-designed experiments/demos and discussions explaining a scientific concept either studied during the semester or one of student interest (with approval from the instructor). [See Section C.3 below.]

All students are required to take the Lab final exam in order to receive credit for the course.

3. Lab technique/etiquette will be allotted as subjective points toward the lab grade as deemed by the instructor (25 points). Evaluations are based on cleanliness of lab areas, following instructions, and general abilities in conducting experiments as outlined in each activity. In addition, your peers will also contribute a “Peer Evaluation” of each group member’s participation and effort while working in the group throughout the semester. This portion of the grade will not constitute more than 25 points towards the total semester grade.

C. Field Work: All activities in this section are intended to be included in your Portfolios:

1. The course will include several activities that necessitate the use of the Internet and various software programs that will be provided. Basic computer skills will be beneficial for completing these activities.

2. Students will design, construct, and demonstrate two experiments or demonstrations for the class during the last lab session. This will count as the lab final (see Section V. B 2 above). One demo will be of an already existing experiment, and one that will be an original, student-designed experiment or demo. Details and suggestions will be given later.
3. A journal or collection of news articles (both from printed and broadcast media) pertaining to chemistry and chemical applications. Short synopses of appropriate articles will be collected over the course of the semester—advance notice will be given. A maximum of 25 possible bonus points will be awarded for the successful completion of this activity.

4. Homework Problems: You are strongly encouraged to work ALL of the assigned problems—I do not give “busy work”! If it is important, it will show up in problems assigned from the text and/or “problem sets” that I distribute during lecture/lab. These are not graded assignments; you are expected to work them out on your own. The answers to odd-numbered Exercises and Problems are in Appendix C of the text. Other solutions will be made available by the instructor.

E. Grade Breakdown:

Summary of Assignments:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams</td>
<td>300 pts</td>
<td>30%</td>
</tr>
<tr>
<td>Lab Expts.</td>
<td>500 pts</td>
<td>50%</td>
</tr>
<tr>
<td>Expt/Demo Lab</td>
<td>50 pts</td>
<td>5%</td>
</tr>
<tr>
<td>FINAL Exam</td>
<td>150 pts</td>
<td>15%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1000 pts</td>
<td></td>
</tr>
</tbody>
</table>

Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0 - 100.0</td>
<td>A</td>
</tr>
<tr>
<td>87.5 - 89.9</td>
<td>B+</td>
</tr>
<tr>
<td>80.0 - 87.4</td>
<td>B</td>
</tr>
<tr>
<td>77.5 - 79.9</td>
<td>C+</td>
</tr>
<tr>
<td>70.0 - 77.4</td>
<td>C</td>
</tr>
<tr>
<td>60.0 - 69.9</td>
<td>D</td>
</tr>
<tr>
<td>Below 60.0</td>
<td>F</td>
</tr>
</tbody>
</table>

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

B. Academic Dishonesty:

With any form of valid proof of dishonesty with regard to student work or testing, the instructor may elect from a range of actions. Academic misconduct could lead to failure for the assignment, and/or the entire course on consultation with the program coordinator and Department Head. Additionally, dismissal from the institution is an option and may be sought.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical
information to share, or if you need special arrangements in case the building must be
evacuated, please inform the instructor immediately. Please see the instructor privately after
class or in his/her office. Students must present a current accommodation plan from a staff
member in Services for Students with Disabilities (SSWD) in order to receive accommodations
in this course. Services for Students with Disabilities may be contacted by going to Goins 127
or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.

D. Other Policies:

Cell phones are not to be used in the classroom at any time. Please turn off (or on vibrate) all
cell phones and pagers or other electronic devices that make audible sounds that may disturb
the classroom environment as deemed by the instructor.

Visitors/minors are not allowed in the classroom or the laboratory.

Posted: September 15, 2006