PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

PRINCIPLES OF CHEMISTRY
CHEM 1010 (formerly CHM 1000)

Class Hours: 3.0
Laboratory Hours: 3.0
Credit Hours: 4.0
Revised: Fall 2004

Catalog Course Description:

Atomic structure, periodic law, bonding, gas laws, liquid and solid states, solutions, acids and bases, oxidation and reduction, reactions and equilibrium. Course includes 3 hours of lecture and 3 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. Reading/writing at the college level is also expected.

Prerequisites:

Two years of high school algebra and completion of DSP math requirements.

Textbook(s) and Other Course Materials:


Optional Materials: General Chemistry I, II CD-ROMs. These materials may be helpful in assimilating the more difficult concepts and may provide supplemental problems and assessments for course material.

I. Week/Unit/Topic Basis: (TENTATIVE)

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Intro. to the Course; Ch. 1: Matter, Energy, &amp; Measurement</td>
</tr>
<tr>
<td>2</td>
<td>Finish Ch. 1; Ch. 2: Atoms</td>
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<tr>
<td>3</td>
<td>Ch. 2: Atoms</td>
</tr>
<tr>
<td>4</td>
<td>Ch. 3: Chemical Bonds</td>
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<tr>
<td>5</td>
<td>Ch. 3: Chemical Bonds</td>
</tr>
<tr>
<td>6</td>
<td>Ch. 4: Chemical Reactions</td>
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</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, Mathematics Outcome, Natural Sciences Outcome

3. Collect and interpret chemical laboratory data. Technological Literacy Outcome, Mathematics Outcome, Natural Sciences Outcome, Active Learning Strategy

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

5. Learn and use chemical terms, name chemical compounds, understand and predict chemical behaviors. Communication Outcome, Natural Sciences Outcome
6. Understand and communicate the relevance of chemistry to the student’s chosen field of work. *Natural Sciences Outcome, Transitional Strategy*

7. Correlate laboratory observations with theoretical concepts presented in lecture. *Active Learning Strategy*

*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. 

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

3. Write the electronic structure of an atom and predict properties of the elements using the periodic table. 

4. Draw Lewis structures for the elements and compounds, predict shape and polarity of covalent compounds. 

5. Write and balance chemical equations. 

6. Determine oxidation numbers, name compounds and write their formulas. 

7. Label bond type(s) for an element or compound and describe molecular type. 

8. Classify chemical reactions. 

9. Understand the concept of electrolytes. 

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

11. Understand the dissolution process and colligative properties. 

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

13. Understand the concepts of chemical equilibria and chemical kinetics, and determine the equilibrium and rate constants. 

14. Recognize electrolytes and understand their behavior. 

15. Identify nuclear particles and balance nuclear reactions. 

16. Understand radioactive decay of a nuclide and determine its rate of decay and half-life. 

17. Distinguish between nuclear fusion and fission.
18. Develop an understanding of the scientific method and applications in chemistry and in everyday life. A

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

V. Evaluation:

A. Testing Procedures: 75 % of grade

- **Chapter tests**: 50% of the course grade: 6 tests (approximately one test every two weeks) will be given. One test may be dropped. Tests will be multiple choice, short answer, fill-in-the-blank, and discussion/problem solving.
- **Midterm Exam**: 10% of the course grade. (This test will be multiple choice).
- **Comprehensive final exam**: 15% of the course grade. (This test will be multiple choice).

All students are required to take the midterm and comprehensive final exams in order to receive credit for the course. Tests may be made up only if the student can show that the absence is excused. Make up tests are permitted only if the instructor agrees. If the student will not be able to take a scheduled test for a valid reason, the student is required to contact the instructor prior to the time of the scheduled class test to make other arrangements. If a student is going to be out of town for the scheduled test, the student is required to notify the instructor prior to the scheduled test if the student wants to be able to make up the missed test. Any other missed tests will count as a zero.

B. Laboratory Expectations: 25% of grade

A comprehensive lab final will be given on the last day of lab. Attendance is required for scheduled lab meetings. Lab report sheets must be completed in INK. Contact lenses may not be worn in the laboratory.

C. Field Work:

Bonus opportunities may be available at the discretion of the instructor: A maximum of 15 possible bonus points will be awarded for the successful completion of any activity, but no more than 5% of the total course points may be earned in this manner.

D. Other Evaluation Methods:

- **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. These are not graded assignments; you are expected to work them out on your own.
- **Help**: Please e-mail me or come to office hours as soon as you start having trouble in working the problems. Also you may obtain free tutoring at the Learning Center in 330 ERC (check schedule there).

E. Grading Scale:

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<tr>
<th>Points Range</th>
<th>Letter Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>90.0 - 100.0</td>
<td>A</td>
<td>5 Tests 500 points</td>
</tr>
<tr>
<td>87.5 - 89.9</td>
<td>B+</td>
<td>Lab 250 points</td>
</tr>
<tr>
<td>80.0 - 87.4</td>
<td>B</td>
<td>Midterm Exam 100 points</td>
</tr>
<tr>
<td>77.5 - 79.9</td>
<td>C+</td>
<td>Final Exam 150 points</td>
</tr>
<tr>
<td>70.0 - 77.4</td>
<td>C</td>
<td>TOTAL 1000 points</td>
</tr>
<tr>
<td>60.0 - 69.9</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Below 60.0</td>
<td>F</td>
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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 and Classroom Misconduct:

The instructor has the primary responsibility for control over classroom behavior and maintenance of academic integrity and can order the temporary removal or exclusion from the classroom of any student engaged in disruptive conduct or conduct in violation of the general rules and regulations of Pellissippi State. Extended or permanent exclusion from the classroom or further disciplinary action can be effected only through appropriate procedures of Pellissippi State. Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work
- Taking an exam for another student
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor
- Any of the above occurring within the Web or distance-learning environment.
- Upon discovery of a student's participation in academic misconduct, the student is immediately responsible to the instructor of the class, who will meet with the offending student with evidence of the misconduct. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.
- Pellissippi State students accept full responsibility for the quality and authenticity of submitted course work. When confronted with evidence of academic misconduct, students may admit their participation and accept the penalty imposed by the instructor. The instructor will inform the department head of the violation, and the department head will forward written notice of the violation to the dean of Student Affairs, who will keep records of the incident.

C. Accommodations for disabilities:

If you need accommodation 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. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.

D. Other Policies

Visitors are not allowed in the classroom or the laboratory.