APPLIED CHEMISTRY I W/LAB
CHT 1110

Class Hours: 3.0  Credit Hours: 4.0
Laboratory Hours: 3.0  Date Revised: Fall 2001

NOTE: This course is not designed for transfer credit.

Catalog Course Description:

Course topics include modern atomic theory, chemical bonding, periodic relationships, chemical nomenclature, chemical formulas, stoichiometry, oxidation and reduction, electrochemistry, and quantitative treatment of gas laws. Laboratory emphasis will be on individual work, and an industrial-type notebook will be maintained. Course includes three hours of lecture and three hours of laboratory applications each week.

Entry Level Standards:

Students entering this course should have proficiency in algebra equivalent to satisfactory completion of at least one year of high school algebra, and writing skills necessary for keeping a laboratory notebook record of experiments performed.

Prerequisites:

None

Textbook(s) and Other Reference Materials Basic to the Course:


I. Week/Unit/Topic Basis:

<table>
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<th>Week</th>
<th>Topic</th>
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</table>
| 1    | Lecture: Chemical symbols, Physical Units, and Significant Figures  
Lab: Lab familiarization (no report) |
| 2    | Lecture: Chemical Formula Stoichiometry  
Lab: Density and specific heat |
| 3    | Lecture: Physical and Chemical Changes and Chemical Nomenclature  
Lab: Chemical and physical changes |
| 4    | Lecture: The concept of the mole. Chemical Reaction Stoichiometry; Balancing |
II. Course Objectives*:

A. Understand the relations between atomic structures and chemical bonding, and to predict from those relations technically important chemical properties of elements. I, II, III, IV

B. Understand the relation of chemical bonding to molecular structure and apply that understanding to predict chemical properties of molecular compounds. II, III, IV

C. Understand the interactions of electromagnetic radiation with matter sufficiently to interpret results of chemical analysis methods based on those interactions. II, III, IV

D. Understand the systematic nomenclature of inorganic compounds in relation to the structure of such compounds. II, III, IV

E. Relate quantitatively the required amounts of reactant inputs to a chemical reaction to specified output amounts and concentrations of reaction products. I, II, III, IV, V

F. Understand oxidation-reduction electrochemistry and apply that understanding to
III. Instructional Processes*:

Students will:

1. Attend lectures and discuss concepts. *Communication Outcome, Problem Solving and Decision Making Outcome, Information Literacy Outcome, Active Learning Strategy*

2. Solve assigned problems out of class and be prepared to discuss the problem solutions. *Communication Outcome, Problem Solving and Decision Making Outcome, Information Literacy Outcome, Active Learning Strategy*

3. Participate in laboratory experiments which are direct applications of the concepts studied. *Problem Solving and Decision Making Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy, Transitional Strategy*

4. Perform laboratory experiments, collect data and keep a research style lab notebook. *Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*

*Strategies and outcomes listed after instructional processes reference Pellissippi State’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. Describe atomic structure in terms of nucleons, electrons, and elementary quantum mechanics. A

2. Understand the major interactions of atomic orbital electrons with electromagnetic radiation. A

3. Qualitatively predict properties of the elements form their electronic structure, and understand the periodicity of those properties. A

4. Calculate mass compositions of compounds from their mole formulas, and calculate mole formulas from mass compositions. B

5. Write chemical equations obeying the law of conservation of matter and correctly expressing the quantitative relation of reactants to products. B

6. Calculate in mass units and in mole units the amounts of product obtainable from specified amounts of reactants. B

7. Use the periodic table to predict properties of the elements. B

8. Use the periodic table to predict trends in properties of elements. B

9. Use the periodic table to predict types of chemical bonding in compounds. B

10. Deduce from the type of chemical bonding the properties of compounds. C
11. Relate oxidation-reduction type reactions to the occurrence of corrosion of metals.  C
12. Use oxidation reduction standard potentials to predict the occurrence and the suppression of corrosion of metals.  C
13. Understand the relationships among hydrogen ion concentration, pH, and the hydrogen electrode potential.  C
14. Use bond energy data to predict preference among competing reactions.  D
15. Calculate compositions of mixtures whose reactions do not equilibrate at completion of the reaction.  D
16. Apply change of phase processes to separating the components of mixtures.  E
17. Understand the chemical reactions of electrical batteries.  E
18. Predict the voltage and the current output of primary electrical cells.  F
19. Predict the voltage and the current storage capacity of secondary electrical cells.  F
20. Apply the principles of electrical battery chemistry to electrolysis.  F
21. Understand the qualitative relations of kinetic molecular energy and intermolecular attraction to change of phase states.  F
22. Use the Ideal Gas Law in simple calculations.  F

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

V. Evaluation:

A. Testing Procedures: 60% of grade (lecture)

Tests at the conclusion of each unit or two units will include discussion questions, definitions, numerical computation problems and multiple choice questions, but not necessarily every type on each test. A minimum of five such tests will be administered during the semester. Evaluation will also be made through a comprehensive final examination for all students who have not achieved an average score of 90 or above on the lecture activities. The lecture course evaluation will be based on the average of the chapter tests, the homework, and the average grade on short (5-10 min.) in-class quizzes. The homework average grade and the average of the short quizzes each count as one chapter test. The two lowest grades of tests, homework average and quizzes average, will be dropped when calculating the course grade. The final examination, if taken, will count 15% of the lecture course grade. Students earning exemption from the final are given a final grade equal to their chapter test average. No makeup tests will be administered. In case of medical problems or bonafide emergency, see the instructor.

B. Laboratory Expectations: 40% of grade (lab)

Laboratory grades will be determined by averaging the grades of 14 laboratory reports, kept in a laboratory notebook, including problem work assigned in the laboratory manual.

C. Field Work:
Outside reading of material in the library will be required in this course.

D. Grading Scale:

<table>
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<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 - 100</td>
<td>A</td>
</tr>
<tr>
<td>87 - 89</td>
<td>B+</td>
</tr>
<tr>
<td>80 - 86</td>
<td>B</td>
</tr>
<tr>
<td>77 - 79</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 76</td>
<td>C</td>
</tr>
<tr>
<td>60 - 70</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</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 (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

Chemical/Environmental Engineering Technology Program:

Regular attendance in this course is required. Students who miss the equivalent of 10% of either classroom hours or laboratory may, at the discretion of the instructor, have their course grade dropped by one letter. Students who arrive late for a class after the roll has been called have the responsibility of seeing the instructor after class to change their status from A (absent) to T (tardy).

B. Academic Dishonesty:

Any student found cheating on an examination will receive a score of zero for that examination. Anyone found cheating a second time during the course will be dismissed from the course with a grade of failing.