

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

PRINCIPLES OF CHEMISTRY
CHEM 1010 (formerly CHM 1000)

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

**Date Revised: Spring
01**

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.

Prerequisites:

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

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

Stoker, J. Stephen, *General, Organic, and Biological Chemistry*. 1st edition. Houghton Mifflin Company, 1998.

Bettelheim, Fredrick A. and Joseph Landesberg. *Laboratory Manual for General, Organic and Biochemistry*. (Customized edition,) Saunders College Publishing, 1997.

I. Week/Unit/Topic Basis:

| Week | Topic |
|-------------|--|
| 1 | Introduction to the Course |
| 2 | Basic Concepts About Matter, Ch. 1 |
| 3 | Measurements in Chemistry, Ch. 2 |
| 4 | Atomic Structure and the Periodic Table, Ch. 3 |
| 5 | Chemical Bonding: The Ionic Bond Model, Ch. 4 |
| 6 | Chemical Bonding: The Covalent Bond Model, Ch. 5 |
| 7 | Chemical Calculations, Ch. 6 |
| 8 | Gases, Liquids, Solids, Ch. 7 |
| 9 | Solutions, Ch. 8 |

- 10 Solutions, Ch. 8 (continued)
- 11 Chemical Reactions, Ch. 9
- 12 Chemical Reactions, Ch. 9 (continued)
- 13 Acids, Bases, and Salts, Ch. 10
- 14 Acids, Bases, and Salts, Ch. 10 (continued)
- 15 Nuclear Chemistry, Ch. 11; Review
- 16 Final Exam

II. Course Objectives*:

- A. Understand the fundamental concepts of atomic structure, molecular structure, and bonding. I.5
- B. Predict properties of elements from the periodic table based on an acquired knowledge of periodic law. I.5
- C. Apply the laws of chemistry and utilize the necessary mathematics to solve problems in chemical relationships. VI.2
- D. Understand the fundamental concepts of kinetic molecular theory. I.5
- E. Demonstrate knowledge of the nature and behavior of electrolytes. I.5
- F. Identify nuclear particles, balance nuclear equations, and distinguish between nuclear fission and fusion. I.5, VI.1

*Roman numerals after course objectives reference goals of the university parallel program.

III. Instructional Processes*:

Students will:

- 1. Demonstrate problem-solving ability with emphasis on chemical word problems and perform mathematical calculations. *Problem Solving and Decision Making Outcome, Numerical Literacy Outcome*
- 2. Use appropriate methods and equipment for making chemical observation and measurements in a laboratory setting. *Technological Literacy Outcome, Numerical Literacy Outcome*
- 3. Collect and interpret chemical laboratory data. *Technological Literacy Outcome, Numerical Literacy Outcome, Active Learning Strategy*
- 4. Locate, read, and interpret scientific information in printed media. *Communication Outcome, Personal Development Outcome, Information Literacy Outcome*
- 5. Learn and use chemical terms, name chemical compounds, understand and predict chemical behaviors. *Communication Outcome, Problem Solving and Decision Making Outcome*
- 6. Understand and communicate the relevance of chemistry to the student's chosen field of work. *Transitional Strategy*

7. Correlate laboratory observations with theoretical concepts presented in lecture. *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. 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. Write the electronic structure of an atom and predict properties of the elements using the periodic table. A, B
4. Draw Lewis structures for the elements and compounds, predict shape and polarity of covalent compounds. A, B, C
5. Write and balance chemical equations. A, C
6. Determine oxidation numbers, name compounds and write their formulas. A, C
7. Label bond type(s) for an element or compound and describe molecular type. A, D
8. Classify chemical reactions. A, C
9. Understand the concept of electrolytes. E
10. Understand kinetic molecular theory and how it relates to gases, liquids, and solids. D
11. Understand the dissolution process and colligative properties. A, D, E
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. A, B, C
13. Understand the concepts of understand the concepts of chemical equilibria and chemical kinetics, and determine the equilibrium and rate constants. A, B, D
14. Recognize electrolytes and understand their behavior. A, B, E
15. Identify nuclear particles and balance nuclear reactions. C, F
16. Understand radioactive decay of a nuclide and determine its rate of decay and half-life. A, F
17. Distinguish between nuclear fusion and fission. F
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: 60% of the course grade: 7 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.

Comprehensive final exam: 15% of the course grade.(This test will be multiple choice).

All students are required to take the final exam 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.

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:

The following bonus opportunity will be available: 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 and submitted during the 7th week of the semester. A maximum of 25 possible bonus points will be awarded for the successful completion of this activity.

D. Other Evaluation Methods:

N/A

E. Grading Scale:

| | |
|--------------|----|
| 90.0 - 100.0 | A |
| 87.5 - 89.9 | B+ |
| 80.0 - 87.4 | B |
| 77.5 - 79.9 | C+ |
| 70.0 - 77.4 | C |
| 60.0 - 69.9 | D |
| Below 60.0 | F |

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:

Cheating on tests or labs will result in a grade of zero for the exam or lab exercise. Continued cheating may result in a grade of F for the course.