PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

HONORS CHEMISTRY I
CHEM 1110 (formerly CHM 1510)

Class Hours: 3.0 **Credit Hours: 4.0**

Laboratory Hours: 3.0 **Date Revised: Spring 00**

Catalog Course Description:

An advanced investigation of atomic theory, chemical bonding, chemical structure, and reactions. Applications are made to current chemistry-related issues of environmental importance.

Entry Level Standards:

One year of high school chemistry

Prerequisite:

ACT composite of 25 or consent of instructor

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

Chemistry--Structure and Dynamics; Spencer, James N., et.al.1998, John Wiley and Sons.
Chemistry in Context; ACS Publications, 1994, Wm. C. Brown Publishers.
A bound laboratory notebook

I. Week/Unit/Topic Basis:

Week	Topic
1	Scientific calculation methods; elements and compounds; periodic table
2	Moles; chemical equations
3	Stoichiometry; unit conversions
4	Atomic/electronic structure
5	Periodic trends of the elements
6	Molecular bonding; electronic geometry of molecules
7	Ionic and metallic bonding; oxidation and reduction
8	Physical behavior of gases; kinetic molecular theory
9-10	Atmospheric chemistry: air composition, acid rain, ozone depletion, greenhouse effect, global warming
11	Collaborative case-studies

12 Liquids and solutions; intermolecular forces; specific heat

13 Colligative properties

14 Structure and bonding in solids

15 First Law of Thermodynamics; enthalpies of reaction

16 Final Exam

II. Course Objectives*:

A. Demonstrate an understanding of the fundamental concepts of atomic structure, molecular structure, and bonding. I.5

B. Predict properties of elements from the periodic table based on acquired knowledge of periodic law. III.1

C. Apply the laws of chemistry and utilize the necessary mathematics to solve problems in chemical relationships. VI.1

D. Understand the fundamental concepts of Kinetic Molecular Theory. I.5

E. Understand the chemical principles and processes which underlie issues of current environmental concern. III.2

F. Quantify relationships between substances based upon the observed matter and energy changes. VI.1

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

III. Instructional Processes*:

Students will:

1. Utilize current chemical reference literature. *Information Literacy Outcome*

2. Record experimental data and conclusions in a laboratory notebook in a manner acceptable for research and industry. *Communication Outcome, Transitional Strategy, Active Learning Strategy*

3. Determine appropriate method of chemical analysis for a substance based upon certain various physical and chemical parameters. *Problem Solving and Decision Making Outcome, Active Learning Strategy*

4. Critically evaluate arguments as presented in popular news media relating to current environmental concerns and present findings before the class for discussion. *Problem Solving and Decision Making 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. Understand the scope, purpose, and process of chemistry, as one application of the scientific method. A

2. Work problems with metric units, and convert units when necessary. C

3. Properly apply the rules of significant figures. C

4. Understand the subatomic structure of the elements. A

5. Relate the periodic table to the electrical properties of the elements. B

6. Use the periodic table to construct formulas of compounds. B

7. Understand the concepts of atoms, moles, and molecules. A

8. Calculate using atomic weights, formula weights, and percent compositions. C

9. Write and balance chemical equations. B, F

10. Understand the concept of limiting reactant. C, F

11. Understand Quantum Theory, and the means by which light interacts with matter. A

12. Describe the electronic structure of the elements. A, B

13. Use the Shell Model of electron configurations to explain/predict the reactivity of the elements. B

14. Explain the physical characteristics of elements as a result of proton-electron attraction. C

15. Write the quantum numbers for a specific electron. A

16. Understand the principles and mechanism of covalent chemical bonding. A

17. Draw Lewis structures for elements and compounds. A

18. Evaluate formal charge to predict the most stable structure for a compound. A

19. Predict the three-dimensional shape of a molecule based upon its formula and bonding. A

20. Understand the causes, mechanism, and patterns of metal reactivity. B

21. Understand the causes, mechanism, and patterns of nonmetal reactivity. B

22. Understand the relationship between ionic, covalent, and metallic bonds. B

23. Calculate oxidation numbers. A, B

24. Balance oxidation-reduction equations. F

25. Use the patterns of chemical nomenclature to construct formulas of compounds. B

26. Understand temperature as a property of matter. F.?Understand the distinguishing

characteristics of the physical states of matter. A, D

27. Solve problems related to the physical properties of gases. D

28. Understand Kinetic Molecular Theory as it applies to the physical states of matter. D

29. Understand heat in relation to Kinetic Molecular Theory. D, F

30. Calculate using the First Law of Thermodynamics. F

31. Calculate the enthalpy change over the course of a chemical reaction. F

32. Consider bond energies and bond lengths as an indicator of stability. C, D, F

33. Distinguish different modes of intermolecular attraction. A

34. Explain the physical state of a substance under ambient conditions as a function of the substance' s intermolecular forces. A

35. Explain the solubility rules and the process of dissolution. A, B, D

36. Calculate solution concentrations in terms of molarity, and the effect of dilution. C

37. Compare solid lattices based upon the type of bonding. A

38. Understand the physical properties of metals that result from their structure. A, B

39. Distinguish unit cell types. A

40. Calculate atomic and ionic sizes from unit cell dimensions. A

41. Research needed information from both chemical and popular literature. E

42. Understand the physical and chemical processes involved in environmental phenomena (acid rain, ozone depletion, etc..), and the extent to which chemistry may exacerbate or mitigate these phenomena. E

43. Effectively evaluate arguments which may be presented in future debates of environmental issues. E

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

V. Evaluation:

A. Testing Procedures: 50% of grade

Tests (4)	40%
Final exam	10%

B. Laboratory Expectations: 30% of grade

Lab notebook	25%
Lab experiment development	5%

Attendance is required for scheduled lab meetings. Labs may NOT be made up.
All information entered into the lab notebook should be in ink; no " white-out"

allowed. Pages are not to be removed from the lab notebook for any reason.
Safety eyewear must be worn during every lab involving an experiment. See lab schedule for order/dates of all lab work.

C. Field Work: 20% of grade

Issue paper	10%
Collaborative case-studies (3)	6%
Special topic presentations (2)	4%

Each student shall research current literature to develop and present a composition regarding a chemistry-related topic of current interest. The topic may be chosen from a list provided by the instructor, or may be of the student's own suggestion with instructor's approval. Any topic chosen should involve and express modern social and/or environmental concerns.

D. Other Evaluation Methods:

N/A

E. Grading Scale:

A	90-100%
B	80-89.9%
C	70-79.9%
D	60-69.6%
F	> 60%

VI. Policies:

Attendance Policy:

Excessive absences may lower final grade. 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.