PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

HONORS CHEMISTRY II
CHEM 1120 (formerly CHM 1520)

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

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

Catalog Course Description:

An advanced investigation of chemical equilibria and kinetics, electrochemistry, and organic molecules, and nuclear reactions. Applications are made to current chemistry-related issues of environmental importance.

Entry Level Standards:

One year of hight school chemistry

Prerequisites:

A grade of C or better in CHEM 1110.

Corequisites:

None

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

I. Week/Unit/Topic Basis:

Week	Topic
1	Chemical equilibrium
2	Chemical equilibrium; Le Chatelier' s principle
3	Acid-base reactions
4	pH; buffers
5	Solubility equilibria
6	Redox reactions
7	Cell potentials; Faraday' s Law
8	Water chemistry; hydrologic cycle; water pollution
9	Rate law ; first and second order reactions

10 Activation energy; Arrhenius equation

11 Nuclear reactions; fission; fusion

12 Nuclear power and nuclear waste

13 Organic hydrocarbons

14 Organic functional groups

15 Polymers

16 Final Exam

II. Course Objectives*:

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

B. Develop and document the specific procedures necessary for the performance of an independently-designed chemical experiment. III.1.

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

D. Critically analyze water quality data in terms of ions present, quantities, and possible sources. III.1.

E. Understand the processes and calculations involved in electrochemical systems.I.5.

F. Manipulate chemical equilibria via application of stress. III.1.

G. Use principles of chemical kinetics to determine rate and mechanism data. III.1.

H. Identify by structure the names and reactivity of elementary organic compounds. I.5.

*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*

3. Understand the theories and principles which underlie observed chemical processes. *Communication Outcome*

4. 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*

5. 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 concept of chemical equilibrium. A, B, C
2. Understand the chemical and physical factors which affect reaction rate. C, D
3. Understand the principles of Collision Theory. A, C, D
4. Define and evaluate the equilibrium expression for various types of reactions. A,C
5. Manipulate chemical reactions through application of stress. B, C, E
6. Explain the relationship between structure and function for acids and bases. C
7. Use the pH scale as a measure of acidity. A, C, E
8. Structurally analyze acid and base molecules to explain their strength. C
9. Understand the processes involved in a buffer solution. B, C, E
10. Produce buffer solutions of desired pH. A, C
11. Calculate solubility limits for some ionic compounds based upon their solubility equilibrium equations. A, B, C
12. Manipulate a chemical reaction to increase the solubility of a compound. A, B, C, E
13. Recognize and balance oxidation-reduction reactions. F
14. Understand the internal structure of batteries. F
15. Calculate voltages for oxidation and reduction processes. A, F
16. Understand and perform the process of electrolysis. A, B, F
17. Properly explain the processes involved in the hydrologic cycle, and the presence of naturally-occurring solutes. E, G
18. Understand the sources and properties of water-borne pollutants of public concern. E, G
19. Be familiar with remediation methods for water-borne pollutants. E, G
20. Understand reaction rate as a function of concentration. D
21. Establish from experimental data the rate law of a given reaction. A, D
22. Evaluate proposed chemical mechanisms in light of kinetic data. D
23. Understand catalysts and their affect upon reaction rate. D

24. Calculate from experimental data the activation energy of a reaction. A, D

25. Understand the process of radioactive decay, including calculation of halflives. A,E

26. Understand the processes of fission and fusion. E

27. Appreciate environmental and health concerns regarding nuclear power and nuclear wastes. E

28. Balance nuclear decay chains. A, C

29. Utilize both common and IUPAC nomenclatures for hydrocarbon compounds. H

30. Identify constitutional isomers. H

31. Properly identify and name common organic compounds based upon the functional groups present. H

32. Understand the elementary aspects of cation, anion, and free radical polymerization mechanisms. A, H

33. Understand the process of crosslinking, and its effect upon polymer physical properties. H

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

V. Evaluation:

A. Testing Procedures:

Tests (4) 40%
Final exam 10%

B. Laboratory Expectations:

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:

Water quality data analysis 5%
Special topic presentations 10%
Other items, as assigned 5%
(at instructor' s discretion)
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:

90-100%	A
80-89.9%	B
70-79.9%	C
60-69.9%	D
<60%	F

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. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.