

**SOUTHERN CONNECTICUT STATE UNIVERSITY**

CHE 120 – General Chemistry I

Fall Semester, 2002

Tuesday, Thursday: 9:35 – 10:50 am

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Office Hours:

Monday, Wednesday and Friday: 10:00 – 11:00

Tuesday and Thursday: 11:00 – 12:00

Web Page: [www.geocities.com/kowalczg](http://www.geocities.com/kowalczg)

Course number: CHE 120

Credit Hours: 4

Prerequisite(s): Understanding of basic algebra

Course Title: General Chemistry I

**COURSE DESCRIPTION:**

Atomic structure, gas laws, valence, Kinetic-molecular theory, solutions, ionization, redox reaction and periodic classification. An understanding of basic algebra is assumed.

**COURSE CONTRIBUTION:**

CHE 120 is the first of two general chemistry courses that most students need to take. It is the course that is required for elementary education majors. The content of the course covers the basic concepts in chemistry dealing with the composition, properties and reactions of matter.

The course emphasizes problem solving. As such, analytical thinking is necessary for success. While memorization of facts related to chemical concepts will be necessary for some topics, generally a thorough understanding of the chemical theory behind the concept is required.

Chemistry does require a great amount of math and the correct use of mathematical equations is necessary for success in the course. While working knowledge of algebra is required for this course, blind memorization of equations will not be fruitful. Within the course, the student will be required to choose which, of many, equations apply to the particular problem. Furthermore, the student may need to manipulate the equation for the particular needs of the problem. This type of approach to problem solving comes from an understanding of the chemical theory applicable to the problem.

Two methods used in this course to help the student understand the chemical theory involve practice problems and laboratory experimentation. In both of these environments, the student should be able to learn to apply the course material to practical applications.

## LEARNER OUTCOMES & ASSESSMENTS:

1. Classify matter into categories such as solid, liquid, gas, homogeneous, heterogeneous, mixture, element, compound, molecule and ionic solid. (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)
2. Understand the difference between chemical and physical properties, chemical and physical changes. (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)
3. Understand basic atomic structure. (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)
4. Learn how electrons are configured in atoms and molecules. (INTASC 1, NSTA 1, 3, 5, CCCT 1.3, 1.4)
5. Relate electron configuration to the periodic table and elemental properties. (INTASC 1, NSTA 1, 3, 5, CCCT 1.3, 1.4)
6. Learn the concept of oxidation states and use it to understand inorganic nomenclature. (INTASC 1, NSTA 1, 4, CCCT 1.3, 1.4)
7. Write Lewis dot structures for simple inorganic molecules. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)
8. Understand the mole concept. (INTASC 1, NSTA 1, CCCT 1.3, 1.4)
9. Use the mole concept to calculate theoretical and per cent yields for chemical reactions. (INTASC 1, NSTA 3, 4, CCCT 1.3, 1.4)
10. Learn the difference between ionic and covalent bonding. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)
11. Learn to balance chemical equations including redox equations. (INTASC 1, NSTA 3, 4, CCCT 1.3, 1.4)
12. Predict products for metathesis and single replacement reactions using solubility tables and the activity series. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)
13. Understand the thermodynamic concepts of enthalpy, entropy and free energy. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)
14. Predict whether a chemical reaction is spontaneous or non-spontaneous. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)
15. Learn ways of expressing solution concentrations and using them in stoichiometric calculations. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)
16. Learn the gas laws. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)
17. Apply the combined and ideal gas laws to specific gas problems. (INTASC 1, NSTA 3, 4, CCCT 1.3, 1.4)
18. Understand percent composition and be able to determine empirical formulas. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)
19. Relate some of the chemical concepts discussed in lecture with experimentation in the laboratory. (INTASC 1, 3, 4, NSTA 1, 3, 5, 9, CCCT 1.2, 1.3, 1.4, 1.5, 1.6, 2.2, 2.6)

## MODES OF LEARNING

Class lectures are primarily that, however, the students are expected to participate in problem solving in order to reinforce the concepts. Students are required to complete all ten laboratory experiments. The lab experiments reinforce many of the chemical concepts covered in lecture and students are expected to apply the concepts to the laboratory experiments. Please remember that it is the policy of the Chemistry Department at Southern Connecticut State University that, to receive a passing grade in CHE 120, you **must pass the laboratory portion** of the course. A passing grade for the laboratory portion of the course is 60.

There is also a web page for this course: <http://www.geocities.com/kowalczg>. This page is updated on a regular basis and includes all handouts for the course including the course syllabus, any additional course handouts, solutions for handout problems, solutions for all hour exams and announcements as they relate to the course and the lab.

## COURSE OUTLINE

September 3, 5, 10, 12	Chapter 1 – <i>Chemistry: Matter and Measurement</i>
September 17, 19, 24	Chapter 2 – <i>Atoms, Molecules and Ions</i>
<b>September 26</b>	<b>Hour Exam I</b>
October 1, 3, 8, 10	Chapter 3 – <i>Formulas, Equations, and Moles</i>
October 15, 17, 22, 24	Chapter 4 – <i>Reactions in Aqueous Solutions</i>
October 29, November 5, 7	Chapter 8 – <i>Thermochemistry: Chemical Energy</i>
<b>October 31</b>	<b>Hour Exam II</b>
November 12, 14, 19	Chapter 9 – <i>Gases: Their Properties and Behavior</i>
November 21, 26, December 3	Chapter 5 – <i>Periodicity and Atomic Structure</i>
<b>November 28</b>	<b>Hour Exam III</b>
December 5	Chapter 6 – <i>Ionic Bonds and Some Main-Group Chemistry</i>
December 10, 12	Chapter 7 – <i>Covalent Bonds and Molecular Structure</i>

For a schedule of the laboratory experiments, see your lab syllabus.

## REQUIRED TEXT(S)

*Chemistry*, J. McMurry, R. C. Fay, Prentice Hall (2001)  
*Laboratory Manual, Laboratory Experiments for Chemistry, The Central Science*, J. H. Nelsen, K. C. Kemp, Prentice Hall (2002)  
*Study Guide, Chemistry*, D. Fredeen, Prentice Hall (2000)  
*Solutions Manual, Chemistry*, J. Topich, Prentice Hall (2000)

## **COURSE REQUIREMENTS:**

The following problems are suggested that students do to determine their understanding of the material. These problems are not to be handed in but are for the student's benefit. Students should assume that these are the types of problems that will appear on exams. The problems appear at the end of each chapter.

Chapter 1: 29, 30, 32, 33, 34, 44, 45, 51, 53, 55, 57, 59, 60, 61, 62, 64, 65, 68, 69, 71, 72, 73, 74, 77, 78, 79, 81, 82, 83, 84, 88, 89, 90, 91, 96, 98, 99

Chapter 2: 38, 42, 43, 48, 52, 53, 54, 56, 57, 60, 61, 62, 63, 64, 65, 68, 69, 70, 74, 75, 78, 79, 80, 81, 82, 84, 85, 87, 88, 90, 91, 96

Chapter 3: 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 68, 69, 70, 71, 76, 77, 78, 79, 80, 82, 83, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 97, 102, 103, 104, 106

Chapter 4: 30, 31, 32, 33, 39, 40, 42, 43, 44, 45, 52, 53, 54, 55, 60, 61, 62, 63, 64, 65, 66, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 94, 95

Chapter 8: 32, 34, 36, 39, 48, 49, 50, 51, 52, 54, 55, 64, 65, 67, 78, 79, 81, 82, 84, 85, 86, 87, 88, 89, 90, 95, 96, 97, 98, 99

Chapter 9: 35(b), 42, 43, 45, 46, 47, 48, 49, 54, 55, 60, 62, 63, 64, 66, 69, 71, 85, 86, 87

Chapter 5: 30, 31, 32, 33, 34, 50, 56, 57, 58, 65, 66, 67, 68, 69, 70, 71, 78, 82, 83, 85, 86, 87, 90, 91, 93

Chapter 6: 40, 41, 42, 48, 52, 53, 56, 80

Chapter 7: 38, 42, 43, 44, 45, 47, 48, 49, 70, 71, 72, 73

## EVALUATION CRITERIA

Best 2 out of 3 Hour Exams	200 Points (28.6% of final grade)
Best 10 out of 11 Quizzes	100 Points (14.3% of final grade)
Laboratory Grade	200 Points (28.6% of final grade)
Final Exam (cumulative)	<u>200 Points (28.6% of final grade)</u>
Total Possible Points	700 Points (100%)

The final grade is obtained by the percentage of points the student obtained out of 700. The following final grade schedule will be used:

A = 93 - 100%
A- = 90 - 92%
B+ = 87 - 89%
B = 83 - 86%
B- = 80 - 82%
C+ = 77 - 79%
C = 73 - 76%
C- = 70 - 72%
D+ = 67 - 69%
D = 63 - 66%
D- = 60 - 62%

The professor reserves the right to adjust this grading scale for class average at the end of the semester.

## **Disability Resource Office**

If any student has a particular disability-related need in order to participate in this course, you need to make an appointment with the Disability Resource Office located in EN 15 to arrange for special accommodations. The telephone number is 392-6828.

## **Missed/Late Work**

Due to the fact that the lowest exam grade is dropped, there will be no make-up exams except in the case of substantiated illness (a doctor's note is required). There will also be no make-up quizzes. The quizzes will be given on Thursday (as will exams) at the beginning of the class period.

It is also your responsibility to complete all laboratory experiments for the semester. Any lab that is missed because of illness, must be made up that week. If you miss your regularly scheduled lab period, you must see the course professor to receive a lab make up form.

## **Attendance**

Regular and prompt attendance of scheduled classes and laboratory sessions is necessary for academic success. Although I do not take attendance in lecture after the first week of classes, attendance of lecture is strongly recommended.

## **Inclement Weather**

When inclement weather threatens, call the university's WeatherChek voice mail message line (203-392-SNOW) to hear the latest official information on the possible delayed openings, early closings or class cancellations. If a scheduled exam is canceled because of school closing, the exam or quiz will be given at the next meeting of the class. If you are not sure, consult the class web page for updated information regarding the rescheduling of quizzes or exams.

## **Cell Phones**

Students are hereby notified that cellular phones and beepers **MUST** be turned off while in lecture or lab. Under no circumstances are telephones to be answered in class or lab. Students who ignore this policy will be asked to leave.

## **Academic Dishonesty**

Cheating on exams, laboratory reports, quizzes or any other phase of this course will not be tolerated. The student handbook outlines the various prerogatives of the instructor in cases of academic dishonesty.

<b>INTASC STANDARDS</b> [Interstate New Teachers' Assessment & Support Consortium]	<b>PROFESSIONAL STANDARDS</b> National Science Teacher's Association	<b>CCCT</b> [Connecticut Common Core of Teaching]
<p><b>S</b></p> <ol style="list-style-type: none"> <li>1. Knowledge of subject matter</li> <li>2. Knowledge of human development &amp; learning</li> <li>3. Instruction adapted to meet diverse learners</li> <li>4. Use of multiple instructional strategies &amp; resources</li> </ol> <p><b>A</b></p> <ol style="list-style-type: none"> <li>5. Effective learning environment created</li> <li>6. Effective communication</li> <li>7. Lesson planning</li> </ol> <p><b>I</b></p> <ol style="list-style-type: none"> <li>9. Reflection and professional development</li> </ol> <p><b>L</b></p> <ol style="list-style-type: none"> <li>8. Assessment of student learning to improve teaching</li> </ol> <p><b>S</b></p> <ol style="list-style-type: none"> <li>10. Partnership with school and community</li> </ol>	<ol style="list-style-type: none"> <li>1. Content – Structure and interpret the concepts, ideas and relationships in science.</li> <li>2. Nature of Science – Define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community.</li> <li>3. Inquiry – Formulating solvable problems, constructing knowledge from data, exchanging information for seeking solutions, developing relationships from empirical data.</li> <li>4. Context of Science – Relate science to daily life: technological, personal, social and cultural values.</li> <li>5. Skills of Teaching – Science teaching actions, strategies and methodologies, interaction with students, effective organization and use of technology.</li> <li>6. Curriculum – Extended framework of goals, plans, materials and resources for instruction.</li> <li>7. Social Context – Social and community support network, relationship of science to needs and values of the community, involvement of people in the teaching of science.</li> <li>8. Assessment – Alignment of goals, instruction and outcomes, evaluation of student learning.</li> <li>9. Environment for Learning – Physical spaces for learning, psychological and social environment, safety in science instruction.</li> <li>10. Professional Practice – Knowledge and participation in the professional community, ethical behavior, high quality of science instruction, working with new colleagues as they enter the profession.</li> </ol>	<p><b>DEMONSTRATIONS OF KNOWLEDGE</b></p> <ol style="list-style-type: none"> <li>1.1 understanding of student learning &amp; development</li> <li>1.2 understanding of need for different learning approaches</li> <li>1.3 proficiency in reading, writing and mathematics</li> <li>1.4 understanding of central concepts &amp; skills, tools of inquiry and structures of discipline(s)</li> <li>1.5 knowledge of how to design and deliver instruction</li> <li>1.6 recognition of need to vary instructional methods</li> </ol> <p><b>APPLICATION OF KNOWLEDGE THROUGH</b></p> <ol style="list-style-type: none"> <li>2.1 instructional planning based upon knowledge of subject, students, curriculum &amp; community</li> <li>2.2 selection and/or creation of learning tasks that make subject meaningful for students</li> <li>2.3 establishment and maintenance of appropriate behavior standards and creation of positive learning environment</li> <li>2.4 creation of instructional opportunities supporting students' academic, social and personal development</li> <li>2.5 use of verbal, nonverbal and media communication fostering individual and collaborative inquiry</li> <li>2.6 employment of various instructional strategies in support of critical thinking, problem solving and skills demonstration</li> <li>2.7 use of various assessment techniques to evaluate student learning &amp; modify instruction</li> </ol> <p><b>DEMONSTRATION OF PROFESSIONAL RESPONSIBILITY THROUGH:</b></p> <ol style="list-style-type: none"> <li>3.1 professional conduct in accordance with the Code of Professional Responsibilities for Teachers</li> <li>3.2 shared responsibility for student achievement and well-being</li> <li>3.3 continuous self-evaluation regarding choices &amp; actions on students and school community</li> <li>3.4 commitment to professional growth</li> <li>3.5 leadership in the school community</li> <li>3.6 demonstrations of a commitment to students and a passion for improving the profession</li> </ol>

**TENTATIVE COURSE CALENDAR:**

See Course Outline above.

**ADDITIONAL RESOURCES:**

Several worthwhile resources on the Internet are listed below. Some of these sites are primarily tutorial, while others give practice problems.

<http://cw.prenhall.com/bookbind/pubbooks/mcmurry2/>

<http://chemistry.miningco.com/library/blchem101.htm>

<http://chemlab.pc.maricopa.edu/periodic/periodic.html>

<http://science.widener.edu/svb/tutorial/>