SOUTHERN CONNECTICUT STATE UNIVERSITY
CHE 120 – General Chemistry I
General Syllabus
Lectures: TBA

Name: 
Office: 
Phone: 
E-mail: 

Office Hours: 
TBA

Course number: CHE 120  Credit Hours: 4  Prerequisite(s): MAT 100 or 102, or placement in MAT 108
Course Title: General Chemistry I

COURSE DESCRIPTION:

<table>
<thead>
<tr>
<th>Expected Student Learning Activity</th>
<th>Weekly Hours for Course*</th>
<th>Total Hours for Course (14 week semester)</th>
<th>Term Credits Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture time (Contact Hours)</td>
<td>3</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Reading and Study Time</td>
<td>4</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Recitation</td>
<td>1</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Laboratory (Contact Hours)</td>
<td>3</td>
<td>42</td>
<td></td>
</tr>
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<td>Laboratory Reports</td>
<td>3</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
<td>3 (midterms)</td>
<td>2 (Final Exam)</td>
</tr>
<tr>
<td>Total Hours</td>
<td>14</td>
<td>198</td>
<td>4</td>
</tr>
</tbody>
</table>

* Please note that these times are only estimates based on the Department of Education’s definition of a credit hour and do not guarantee a specific grade in the course. Students may find that they require more or less time to succeed in the course.

Chemistry 120, General Chemistry I, is the first semester of a two-semester introduction to the basic principles of chemistry. The course will contain a systematic study of the fundamental laws and theories of chemistry. Modern Theories of atomic and molecular structure, chemical bonding, periodic relations, chemical reactions, and stoichiometry will be covered. In addition, there will be an introduction to VSEPR, MO theory and gaseous states of matter. Laboratory experiments will demonstrate the scientific method and illustrate the basic concepts presented in the lecture portion of the course.
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 & ASSESSMENT:

1. Classify matter into categories such as solid, liquid, gas, homogeneous, heterogeneous, mixture, element, compound, molecule and ionic solid. Students will be expected to recognize the basic forms of matter through homework assignments, quizzes and exams. (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)

2. Understand the difference between chemical and physical properties, chemical and physical changes. Students will be asked to characterize matter’s properties by making measurements of various substances in a laboratory setting. (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)

3. Understand basic atomic structure. Students will be able to recognize the atomic symbols that indicate atomic number and mass number, determining the number of protons, neutrons and electrons, (INTASC 1, NSTA 1, 2, 4, CCCT 1.3, 1.4)

4. Learn how electrons are configured in atoms and molecules. Students will learn in lecture and via assigned problems how to distribute electrons in the various energy levels around the nucleus of the atom. (INTASC 1, NSTA 1, 3, 5, CCCT 1.3, 1.4)

5. Relate electron configuration to the periodic table and elemental properties. Students will be able to recognize how the electron’s are distributed around the nucleus of an atom by seeing what column or row an element is located in. (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. Students will learn rules for assigning oxidation numbers through class lectures and assigned problems and how these apply to the three systems of nomenclature for ionic, molecular, and transition metal compounds including nomenclature of acids. Nomenclature will be tested on quizzes and exams throughout the semester. Students will be required to name compounds based on the formula provided or write the formula based on the name provided. (INTASC 1, NSTA 1, 4, CCCT 1.3, 1.4)

7. Write Lewis dot structures for simple inorganic molecules. Students will do hands-on
exercises in laboratory to build models to visualize the three-dimensional structures predicted by Lewis dot structures. Students will be taught the systematic rules for counting valence electrons and building all structures as well as the limitations imposed by these rules. Students will be expected to draw correct structures and answer questions analyzing the structures obtained. (INTASC 1, 4 NSTA 1, 2, 3, CCCT 1.3, 1.4)

8. Apply the concept of the Pauling Electroneutrality Principle for drawing preferred Lewis structures. Student will be able to demonstrate the ability to assess a simple Lewis structure and calculate formal charges as a guide to determining a preferred structure. The preferred structure will be required to answer questions on exams, quizzes, and in the laboratory exercises. (INTASC 1, 4 NSTA 1, 2, 3, CCCT 1.3, 1.4)

9. Understand the concept of molecular orbital theory for simple diatomic molecules. Students should be able to construct simple MO diagrams, identify components of MO diagrams such as HOMO, LUMO, electron occupancy and bond orders for examinations and quizzes. (INTASC 1, 4 NSTA 1, 2, 3, CCCT 1.3, 1.4)

10. Understand the mole concept. Students will use the concept of dimensional analysis to learn how to convert any quantity (grams, milliliters, etc.) to moles and vice versa. The comparison will be made that a mole is a chemist's “dozen”. Students will apply the knowledge on assigned problems, quizzes, and examinations. Experimental determination of masses of reaction products will be used to relate empirical formulas to the mole concept when determining the formula for ionic compounds (INTASC 1, NSTA 1, CCCT 1.3, 1.4)

11. Use the mole concept to calculate theoretical and percent yields for chemical reactions and the concept and calculations related to limiting reactants. With a balanced chemical equation, students will be expected to predict how many grams of a product can be formed from a given amount of reactant. Assigned problems and laboratory exercises will re-enforce this concept through problem solving and graphical interpretation of experimental results. (INTASC 1, NSTA 3, 4, CCCT 1.3, 1.4)

12. Learn the difference between ionic and covalent bonding. Using the Periodic Chart of the Elements, students will be able to predict whether two elements will be most likely to form attractions that share electrons (covalent) or attractions that transfer electrons (ionic). This will also serve as a basis for nomenclature rules and determining the name for a compound when the formula is provided. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)

13. Learn to balance chemical equations including redox equations. Students will be able to balance oxidation-reduction reactions by the method of half-reactions in either acidic or basic medium. This knowledge will be demonstrated on assigned problems, quizzes and exams. The determination of stoichiometric coefficients via interpretation of graphs from experimental data will also be demonstrated (INTASC 1, NSTA 3, 4, CCCT 1.3, 1.4)

14. Predict products for metathesis and single replacement reactions using solubility tables and patterns of reactivity discussed in lecture and used in the laboratory exercises. Students will perform laboratory experiments that will illustrate how to recognize whether a chemical reaction has taken place or not. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)

15. Learn ways of expressing solution concentrations and using them in stoichiometric calculations. Expanding on learner outcome number 10 above, students will be able to calculate moles of substances (reactants or products) from volumes using density or the Molar volume of a gas at standard temperature and pressure. The student will demonstrate the knowledge on assigned problems, quizzes, and exams. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)

16. Learn the gas laws and apply the appropriate gas law to mathematical calculations to determine density, molar mass, moles, volume, pressure, or temperature of a gas sample. (INTASC 1, NSTA 1, 3, CCCT 1.3, 1.4)
17. Understand percent composition and be able to determine empirical formulas. Students will demonstrate an understanding of the concepts by performing mathematical calculations on assigned problems, quizzes, and exams. (INTASC 1, NSTA 1, 3, 4, CCCT 1.3, 1.4)
18. Relate the chemical concepts discussed in lecture with experimentation in the laboratory. Various specific examples are outlined above. (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 both in lecture and in recitation sections in order to reinforce the concepts. Students are required to complete all ten, laboratory experiments as well as attending recitation sessions and completing ten quizzes during recitation. 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%.

COURSE OUTLINE

Lectures 1-3
Lectures 4-6
Lectures 7-8, 10-11
Lecture 9
Lectures 10-12
Lectures 12-14
Lectures 15-17
Lecture 18
Lectures 19-20
Lectures 21-23
Lectures 24-25
Lecture 26
Lectures 27-28

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

REQUIRED TEXT(S)


These two should come as a package with a custom printing of the text (Volume 1) and online tutorial access via WileyPlus.
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: 9, 10, 11, 12, 13, 14, 15, 16, 27, 28, 29, 30, 31, 40, 42, 48, 49, 52, 53, 59

Chapter 2: 2, 3, 5, 6, 9, 10, 12, 14, 15, 16, 17, 19, 20, 22, 23, 26, 27, 28, 29, 30, 32, 34, 36, 37, 38, 39, 40, 41, 50, 62, 66, 80, 88

Chapter 3: 1, 2, 7, 8, 9, 10, 12, 13, 18, 19, 20, 22, 25, 30, 31, 34, 35, 36, 37, 38, 39, 43, 44, 45, 46, 47, 48, 49, 51, 65, 66, 67, 68, 75, 76, 77, 79, 80, 81, 82, 83, 84, 85, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99

Chapter 4: 3, 5, 6, 8, 17, 19, 29, 30, 33, 34, 35, 36, 49, 50, 51, 52, 53, 54, 57, 58, 67, 68, 69, 79, 80, 81, 82, 83, 85, 91, 92, 95, 97, 99, 101, 103, 105, 109, 111, 113, 119, 121, 123, 125, 127, 129, 131

Chapter 5: 1, 5, 6, 8, 9, 10, 11, 16, 19, 20, 21, 25, 26, 27, 28, 29, 35, 36, 42, 43, 44, 45, 47, 51, 52, 53, 55, 61, 62, 63, 64, 65, 66, 67, 69, 71, 75, 77, 79, 81, 82, 83, 85, 87, 89, 93, 99, 107

Chapter 6: 1, 2, 3, 4, 5, 23, 24, 25, 13, 14, 15, 16, 25, 27, 29, 35, 37, 39, 47, 51, 52, 53, 54, 65, 67, 71

Chapter 8: 1, 2, 3, 5, 7, 8, 15, 17, 18, 19, 20, 21, 24, 31, 32, 34, 39, 40, 45, 47, 48, 49, 50, 58, 59, 60, 63, 64, 65, 66, 67, 77, 79, 81, 91, 92, 93, 94, 95, 97, 101, 105, 109, 111, 113, 119, 125, 127, 129, 131, 135

Chapter 9: 2, 5, 10, 11, 13, 17, 18, 19, 20, 22, 32, 33, 34, 35, 36, 44, 45, 50, 51, 52, 56, 57, 58, 64, 68, 70, 80, 82, 84, 88, 90, 92, 96, 98, 99, 102, 106, 107, 108, 109, 110

Chapter 10: 2, 3, 6, 8, 10, 11, 13, 16, 19, 22, 24, 31, 32, 33, 34, 38, 41, 42, 43, 44, 76, 78, 82, 83, 86, 88, 90, 92, 94, 96, 97, 98, 104, 108, 109, 110, 113, 114

Chapter 11: 2, 4, 5, 6, 7, 9, 10, 11, 25, 26, 27, 35, 37, 38, 39, 41, 43, 45, 47, 49, 50, 53, 55, 57, 59, 62, 63, 69, 71
EVALUATION CRITERIA

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Best 2 out 3 Hour Exams</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Laboratory Grade</td>
<td>30%</td>
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<tr>
<td>Final Exam (cumulative)</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
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</table>

The final grade is obtained by the percentage of points the student obtained out of 100. The following final grade schedule will be used:

- **A+** = 96-100%
- **A** = 90 - 95%
- **A-** = 86 - 89%
- **B+** = 80 - 89%
- **B** = 76 - 79%
- **B-** = 70 – 75%
- **C+** = 67 – 69%
- **C** = 64 – 66%
- **C-** = 61 – 63%
- **D+** = 58 – 60%
- **D** = 55 – 57%
- **D-** = 50 – 55%
- **F** = <50%

The individual professor reserves the right to adjust this grading scale for the course or the class average at the end of the semester.
**Accommodating Students With Disabilities:** If any student has a particular disability-related need in order to participate in this course they should contact the Disability Resources Office (DRO) as soon as possible to obtain the appropriate documentation. Every effort will be made to accommodate students in this course. The DRO is located at EN C105 or at 203-392-6828.

**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).

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.
**INTASC STANDARDS**
[Interstate New Teachers’ Assessment & Support Consortium]

S
1. Knowledge of subject matter
2. Knowledge of human development & learning
3. Instruction adapted to meet diverse learners
4. Use of multiple instructional strategies & resources

A
5. Effective learning environment created
6. Effective communication
7. Lesson planning

I
9. Reflection and professional development

L
8. Assessment of student learning to improve teaching

S
10. Partnership with school and community

**PROFESSIONAL STANDARDS**
National Science Teacher’s Association

1. Content – Structure and interpret the concepts, ideas and relationships in science.
2. Nature of Science – Define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community.
3. Inquiry – Formulating solvable problems, constructing knowledge from data, exchanging information for seeking solutions, developing relationships from empirical data.
4. Context of Science – Relate science to daily life: technological, personal, social and cultural values.
5. Skills of Teaching – Science teaching actions, strategies and methodologies, interaction with students, effective organization and use of technology.
6. Curriculum – Extended framework of goals, plans, materials and resources for instruction.
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.
8. Assessment – Alignment of goals, instruction and outcomes, evaluation of student learning.
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.

**CCCT**
[Connecticut Common Core of Teaching]

DEMONSTRATIONS OF KNOWLEDGE

1.1 understanding of student learning & development
1.2 understanding of need for different learning approaches
1.3 proficiency in reading, writing and mathematics
1.4 understanding of central concepts & skills, tools of inquiry and structures of discipline(s)
1.5 knowledge of how to design and deliver instruction
1.6 recognition of need to vary instructional methods

APPLICATION OF KNOWLEDGE THROUGH

2.1 instructional planning based upon knowledge of subject, students, curriculum & community
2.2 selection and/or creation of learning tasks that make subject meaningful for students
2.3 establishment and maintenance of appropriate behavior standards and creation of positive learning environment
2.4 creation of instructional opportunities supporting students’ academic, social and personal development
2.5 use of verbal, nonverbal and media communication fostering individual and collaborative inquiry
2.6 employment of various instructional strategies in support of critical thinking, problem solving and skills demonstration
2.7 use of various assessment techniques to evaluate student learning & modify instruction

DEMONSTRATION OF PROFESSIONAL RESPONSIBILITY THROUGH:

3.1 professional conduct in accordance with the Code of Professional Responsibilities for Teachers
3.2 shared responsibility for student achievement and well-being
3.3 continuous self-evaluation regarding choices & actions on students and school community
3.4 commitment to professional growth
3.5 leadership in the school
3.6 demonstrations of a commitment to students and a passion for improving the profession
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://misterguch.brinkster.net/chemfiestanew.html
http://science.widener.edu/svb/tutorial/