Credit Hours: 3  
Prerequisites: none  
Co requisite: CHEM 113  
Classroom: MAL 175, F. O. Rice Auditorium  
11:10-12:00 MWF 175 MAL, F. O. Rice Auditorium and 3:40-4:30 F  126 Gowan

Instructor contact information:  
Dr. Greg Brewer, Professor  
102H or 201 MAL  
202 319 5396 or 5385  
brewer@cua.edu  
1:00 M, 4:00 W, 2:00 F and by appointment

Course Description (from Cardinal Station [http://cardinalstation.cua.edu](http://cardinalstation.cua.edu))

Instructional Methods: lecture


Computer Notes: Access to this syllabus, from which you may link to notes on individual chapters and sample tests, may be obtained at the following: : [http://chemistry.cua.edu/chem103.cfm](http://chemistry.cua.edu/chem103.cfm) or from the Chemistry home page [http://chemistry.cua.edu/](http://chemistry.cua.edu/) then select Faculty, then select Greg Brewer, then select Chemistry 103-1, [http://chemistry.cua.edu/chem1031.cfm](http://chemistry.cua.edu/chem1031.cfm)

Other materials: basic calculator

Course Goals
The purpose of this first course of a two course sequence is to introduce the student to both the qualitative and quantitative foundations of chemistry. The basics of atomic structure, fundamental atomic properties and periodic trends will be used to develop an understanding of chemical reactivity, bonding and molecular shape. An understanding of the differences among the states of matter based on intermolecular forces. A variety of quantitative aspects such as % composition and stoichiometry will be used to illustrate fundamental aspects of mass balance. A general recognition of broad classes of compounds, how they are formed and reactions of these classes of compounds will be explained. The role of energy in chemical reactions will be examined in terms of the First law of Thermodynamics.

Goals for Student Learning
The student will be able to:
1. Solve numerical problems using significant figures.  
2. Know the fundamental units of measurement in the science and how to convert units.  
3. Understand the concept of the nuclear atom and how ions are formed.
4. Know the distinction between metals and non-metals and how to name binary compounds as well as common acids and bases.
5. Know basic patterns of chemical reactivity (combination, combustion, decomposition, metathesis (acid base and precipitation), and simple redox), how to balance equations and predict products of reactions.
6. Be familiar with the stoichiometric relationships between the number of moles (or masses) of reaction and products including reactions in solution.
7. Understand quantitative aspects of a formula, %composition, empirical formula, molecular formula and molar mass. Be able to convert between atomic/molecular and molar levels using N.
8. Understand the First Law and be able to apply it in calculation of enthalpy changes.
9. Understand the electron configuration of any atom based on quantum numbers, shell structure, PEP and Hund’s rules. Be able to use knowledge of the electron configuration to explain/periodic the atomic periodic properties and the outcome of simple combination reactions.
10. Understand the distinction between ionic and covalent molecules.
11. Predict the molecular geometry (both terms for and bond angles) of covalent molecules based on Lewis Structures, number and types of bonds and lone pairs, VSEPR and hybridization.
12. Understand the types of intermolecular forces and how these apply to the states of matter. Understand the fundamentals of KMT and how these apply to the states of matter
13. Be able to use the ideal gas equation to solve for V, P, T, n, m, or molar mass. Be able to solve problems based on Dalton’s Law and Graham’s Law
14. Understand how the phase diagram maps out the G, L, and S regions, the equilibria between them and the energetics of conversion between states.
15. Understand the basic properties of the liquid and solid state, the types of solid compounds and the basics of a unit cell.

Course Requirements:

Quizzes (12.5%): There will be eight (8) quizzes of which your best five (5) will be counted. The quizzes will be short and based directly on the current homework assignments.
Tests (62.5%): There will be five (5) tests. The tests will cover several chapters, are problem oriented, and are based directly on lecture material and textbook coverage. No test grades will be dropped.
Final Examination (25%): The final exam is comprehensive of all material covered in 103.
The dates and coverage for quizzes, tests, and exam are provided in this document

Expectations and policies

Academic honesty: Academic honesty is expected of all CUA students. Faculty are required to initiate the imposition of sanctions when they find violations of academic honesty, such as plagiarism, improper use of a student’s own work, cheating, and fabrication.
The following sanctions are presented in the University procedures related to Student Academic Dishonesty (from http://policies.cua.edu/academicundergrad/integrityprocedures.cfm): “The presumed sanction for undergraduate students for academic dishonesty will be failure for the course. There may be circumstances, however, where, perhaps because of an undergraduate student’s past record, a more serious sanction, such as suspension or expulsion, would be appropriate. In the context of graduate studies, the expectations for academic honesty are greater, and therefore the presumed sanction for dishonesty is likely to be more severe, e.g., expulsion. In the more unusual case, mitigating circumstances may exist that would warrant a lesser sanction than the presumed sanction.”
Please review the complete texts of the University policy and procedures regarding Student Academic Dishonesty, including requirements for appeals, at
http://policies.cua.edu/academicundergrad/integrity.cfm and
http://policies.cua.edu/academicundergrad/integrity.cfm.

**Attendance:** Quizzes, Tests and the Final Examination are based directly on the material from the text presented in lecture. The lecture stresses the most important aspects of the chapter coverage. It is to your distinct advantage to attend all lectures. Students with poor class attendance rarely perform well in a chemistry course and always do worse than they would have done if they had a good attendance record. Further information is available from the following site under item XII.
http://policies.cua.edu/academicundergrad/acregsfull.cfm

**Quiz, Test and Examination:** The quiz, test and examination schedule is provided in this document. All work must appear on the test paper in a legible manner. **You are required to have a basic calculator (not a computer, cell phone, pager, personal organizer etc) with you for the tests (quiz and exam). You may not borrow or share a calculator.** All constants that you need and a periodic chart will be provided.

**Electronic Devices:** Other than calculators as described above electronic devices may not be used during tests or exams. Please turn off all cell phones/pagers and other related devices during all class/test sessions.

**Makeup Policy:** You must request, in writing, prior to the test date to take a makeup test if a University event requires that you miss a test. A form for this purpose is attached to the handout. **Absence from a test or exam will result in a grade of zero being awarded.** Verifiable medical emergencies are the only exception to this policy. The makeup tests will cover the same material and be of the same degree of difficulty as the regular test but will be of a different format. There are no make-ups for the quizzes as your lowest three (3) scores will not be counted. Further information may be obtained from the following site.
http://policies.cua.edu/academicundergrad/classabsenceintercollegiateevents.cfm

**Grading:** Every effort is made to grade your papers in a uniform and fair manner and to return them to you at the next class meeting. An answers key will be posted on the bulletin board outside 102F. The key will indicate the point loss for certain types of errors. It is impossible to itemize the point loss for all possible errors. Common errors such as significant figures or units will typically result in a two point penalty for a problem that was assigned a ten point value. Failure to show work will result in a total loss of points.

**Grading Error:** Please check the answer key first if you feel that you have done a problem correctly and it was graded incorrectly. Test papers which you feel are graded incorrectly should be submitted to Dr. Brewer for review. You must do this prior to the next test date in order to have your paper re-graded. Any questions that you have concerning your grade should be addressed to Dr. Brewer.

**Homework:** You cannot learn chemistry unless you do chemistry problems. You will be assigned homework problems at the start of each class, which are representative of the current material. You should make every attempt to do all of the assigned problems on your own prior to the next class meeting. Solutions are detailed in the Solutions Manual if you are stuck. Questions that you have should be addressed to Dr. Brewer during the Friday afternoon review period or during office hours. A good student will work (and rework) as many problems as possible to learn the material. Many students find it helpful to keep a separate notebook of problems that they have worked. Such collections are quite valuable in reviewing for the test and the final exam. It is a wise practice to devote a constant daily amount of time to studying chemistry and working problems rather than a smaller number of intensive study sessions prior to a test. The average student will find that a week's worth of chemistry is too much to master in a single session.
Campus Resources for student support: (e.g. add contact information for library, tutoring center, writing center, counseling center)

Accommodations for students with disabilities: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the instructor privately to discuss specific needs. Please contact Disability Support Services (at 202 319-5211, room 207 Pryzbyla Center) to coordinate reasonable accommodations for students with documented disabilities. To read about the services and policies, please visit the website: http://disabilitysupport.cua.edu.

Assessment: Your numerical average will be calculated by weighting your scores from the three areas listed below as indicated. Letter grades will be assigned from the above average in strict accordance to the following scale. Grades are not curved.

A (100-91), A- (91-89)
B+ (89-86), B (86-82), B- (82-79)
C+ (79-76), C (76-72), C- (72-69)
D (69-60)
F (below 60)

Quizzes (12.5%): There will be eight (8) quizzes of which your best five (5) will be counted. The quizzes will be short and based directly on the current homework assignments.

Tests (62.5%): There will be five (5) tests. The tests will cover several chapters, are problem oriented, and are based directly on lecture material and textbook coverage. No test grades will be dropped.

Final Examination (25%): The final exam is comprehensive of all material covered in 103.

University grades:
The University grading system is available at http://policies.cua.edu/academicundergrad//gradesfull.cfm#II for undergraduates and http://policies.cua.edu/academicgrad//gradesfull.cfm#iii for graduate students.

Reports of grades in courses are available at the end of each term on http://cardinalstation.cua.edu.
## Course Schedule

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th># periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction: Matter and Measurement</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Atoms, Molecules, and Ions</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Stoichiometry: Calculations with Chemical Formulas and Equations</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Reactions in Aqueous Solution</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Thermochemistry</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Electronic Structures of Atoms</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Periodic Properties of the Elements</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Basic Concepts of Chemical Bonding</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Molecular Geometry and Bonding Theories (9.1-9.6)</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Gases</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Liquids and Intermolecular Forces (11.1-11.6)</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>Solids and Modern Materials (12.1 and 12.2, brief coverage of 12.3-12.7)</td>
<td>2</td>
</tr>
</tbody>
</table>
Quiz, Test, and Exam Dates and Coverage

The following is the schedule of tests and chapter coverage. Any deviation from this schedule will be announced in class at least one week (if possible) in advance of the period. In the event that the University cancels class on a test date and time the test will be held at the next scheduled class meeting.

<table>
<thead>
<tr>
<th>Test #</th>
<th>Date</th>
<th>Time</th>
<th>Chapters Covered</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>9/6</td>
<td>3:40 PM</td>
<td>Chap. 1</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>9/13</td>
<td>3:40 PM</td>
<td>Chap. 2</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Test 1</td>
<td>9/20</td>
<td>3:40 PM</td>
<td>Chaps. 1 and 2</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 3</td>
<td>9/27</td>
<td>3:40 PM</td>
<td>Chap. 3</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 4</td>
<td>10/4</td>
<td>3:40 PM</td>
<td>Chap. 4</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Test 2</td>
<td>10/11</td>
<td>3:40 PM</td>
<td>Chaps. 3 and 4</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 5</td>
<td>10/18</td>
<td>3:40 PM</td>
<td>Chap. 5</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Test 3</td>
<td>10/25</td>
<td>3:40 PM</td>
<td>Chaps. 5 and 6</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 6</td>
<td>11/1</td>
<td>3:40 PM</td>
<td>Chap. 7</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 7</td>
<td>11/8</td>
<td>3:40 PM</td>
<td>Chap. 8</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Test 4</td>
<td>11/15</td>
<td>3:40 PM</td>
<td>Chaps. 7, 8 and 9 (9.1-9.6)</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Quiz 8</td>
<td>11/22</td>
<td>3:40 PM</td>
<td>Chap. 10</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>Test 5</td>
<td>12/6</td>
<td>3:40 PM</td>
<td>Chaps. 10, 11(11.1-11.6) and 12</td>
<td>126 Gowan</td>
</tr>
<tr>
<td>FINAL</td>
<td>12/13</td>
<td>1:00 PM</td>
<td>COMPREHENSIVE</td>
<td>175 Maloney</td>
</tr>
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</table>

You are required to have a calculator (no other electronic device) with you for all tests and the exam.

Request for Makeup Test

(to be completed by student)

Date:

Name:

Test date to be missed:

Requested alternate test date and time:

Reason for request:

(to be completed by instructor)

request granted: ____________ Alternate date and time: ________________

request denied: ______________

Reason: