

WAYNE COMMUNITY COLLEGE
CHM 151 General Chemistry 1

Class Hours: 3

Lab: 3

Clinical/Wk Exp: 0

Semester Hours: 4

Instructor Information

Course Description (CCL)

This course covers fundamental principles and laws of chemistry. Topics include measurement, atomic and molecular structure, periodicity, chemical reactions, chemical bonding, stoichiometry, thermochemistry, gas laws, and solutions. Upon completion, students should be able to demonstrate an understanding of fundamental chemical laws and concepts as needed in CHM 152. This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in natural sciences.

Prerequisite

None

Co-requisite

None

Program Learning Outcomes

The Associate Degree Programs in arts, science, and fine arts prepare students to transfer to a four-year college for a baccalaureate degree (B.A. or B.S.). Graduates of these two-year programs complete the academic requirements and develop the skills in analysis, interpretation, and communication necessary for transfer to a four-year institution.

Students enrolled in these programs should be able to do the following:

1. Recognize characteristics of life-long learning: independent thinking, self-discipline, and ethical behavior.
2. Demonstrate the technological skills needed to advance academic pursuits at a senior institution.
3. Apply a set of analytical and problem solving skills to real-world situations.
4. Demonstrate interpersonal skills that reflect an understanding of diversity and the need for teamwork.
5. Communicate information to a variety of audiences using appropriate written, spoken, and/or visual methods.

Course Learning Outcomes

The general learning outcomes (competencies) for this course are given in the Course Description (see previous page). Detailed learning outcomes (subcompetencies) are listed on the final pages of this syllabus. Students are required to demonstrate proficiency in all subcompetencies by successfully completing each task associated with the subcompetency. Tasks will take the form of questions or problems on quizzes. Students who correctly answer the questions or work the problems will have completed the tasks.

Required Textbooks

Chemistry (4/E), by McMurry and Fay; Prentice Hall ; ISBN: 0-13-140208-0

Chemical Principles in the Laboratory (8/E) by Slowinsky et.al.; Brooks/Cole ISBN: 0-534-42453-8

Other Required Materials/Software

Notebook, pencils/pens, scientific calculator, access to internet (homework will be posted on-line)

Learning/Teaching Methods

Lectures, interactive homework (WebAssign), and labs

Course Requirements / Methods of Evaluation

To demonstrate attainment of learning outcomes for CHM 151, you must achieve an overall average of 70 or better. Points are distributed as follows:

- | | |
|---------------------|--------------|
| 1. Weekly quizzes | 50% of Grade |
| 2. Labs | 25% of Grade |
| 3. On-line homework | 5% of Grade |
| 4. Final exam | 20% of Grade |

Grading Policy/Criteria

CHM 151 uses a ten-point grading scale:

- A = 100 – 90 % of total points and completion of all tasks associated with subcompetencies
- B = 90 – 80 % of total points and completion of all tasks associated with subcompetencies
- C = 80 – 70 % of total points and completion of all tasks associated with subcompetencies
- D = 70 – 60 % of total points; failure to complete 1 or 2 tasks associated with subcompetencies
- F = Below 60 % of total points; failure to complete 3 or more tasks associated with subcompetencies

It is possible to achieve a score greater than 70% and still receive a grade of D or F for the course. This can happen if not all tasks associated with subcompetencies are successfully completed. However, completion of all tasks is not a guarantee of a passing grade.

Student Attendance Policy

The college considers regular class attendance essential to good scholarship and to a workplace ethic that emphasizes responsibility and commitment. Therefore, students must attend 80% of the total hours of this class to receive a passing grade. The instructor will excuse no absences. If a student misses more than 20% of the class meetings and labs (20 hours) before the last day for dropping a course, he/she will receive a grade of W. After the last day to drop, he/she will receive a WF.

Tardiness is a distraction to students in the class and to the instructor, and is to be avoided. Important procedural information is often given in the first few minutes of class. If a student is not present by the time attendance is taken, he/she will be counted absent. The absence will count in the 20 hours allowed for absence. **Students are responsible for work and information given in class whether they are present or not.** If a student has been late or absent, he/she must find out what has been missed.

As part of the attendance policy, due dates and policies for making up work are given on the following page.

Homework:

On-line homework is due at 4:00 PM on Thursday evenings before quizzes. No make-ups or extensions will be granted past this time.

Weekly Quizzes:

Quizzes are given on Fridays during the normal class period. Make-up quizzes can be taken during the class period for another section (preferred) or at the Academic Skills Center. Make-up quizzes must be taken by 1:00 PM on the Monday following the quiz date. Students may take two (2) quizzes outside their normal class periods; additional absences during a quiz period will result in grades of zero (0).

Laboratories:

The laboratory is open on Tuesday afternoons and all day Thursday. Students must complete the assigned 3-hour experiment at some time during the open laboratory for each week. The Advanced Study Assignment (ASA) for the experiment must be completed prior to starting lab work. Absence from a lab counts as 3 hours of absence. If a student misses a lab, he/she should make it up the following week, after completing the scheduled experiment for the day. If this is not possible, the student should turn in the ASA; it is worth a maximum of 5 points. Students may make up two experiments during the term; additional missed labs will result in grades of zero (0).

Academic Integrity Statement

See the WCC Student Handbook or College Catalog for the WCC Code of Student Academic Integrity Policy. Any student caught violating the WCC Code of Student Academic Integrity Policy (i.e., cheating, plagiarizing, or other dishonorable acts), in academic work is subject to disciplinary action.

Students with Disabilities

WCC is committed to seeing that students with disabilities have equal access to and participation in all programs of study. For further explanation, please note the Students with Disabilities policy in the WCC catalog or the Student Handbook. Students with disabilities can contact the Disability Coordinator, Mrs. Caroline Smith, in the Student Development office, Room WLC 115, or at 919-735-5152, extension 223 or csmith@waynecc.edu.

Non-Discriminatory Statement

Wayne Community College is committed to a policy of providing educational opportunities to all students regardless of economic or social status, beliefs, sexual orientation, age, national origin, or physical or mental disability.

Additional Information From the Instructor/Miscellaneous**1. Communication devices**

Cell phones, beepers, and walkie-talkies cause unnecessary disruption to the teaching/learning process. Out of courtesy to others, all systems of communication should be in quiet position during class and lab. Students should not take or place calls during class or lab.

2. Music/video players

There will be no CD players, Walkmans, or I-Pod type devices used in class or lab.

CHM 151 Schedule for Spring Term 2005

January

2						7 Unit 1 Introduction Measurements Chapter 1	8
9		10 Unit 1 Cont'd	11 Lab Introduction Lab Safety	12 Unit 1 Cont'd	13	14 Quiz 1 Comp I-1	15
16	17 Dr. Martin Luther King Holiday	18 Lab # 1 Density	19 Unit 2 Atoms, Ions, Molecules Stoichiometry I Ch 2.1-2.8, 3.2-3.3, 3.11-3.12	20	21 Unit 2 Cont'd	22	
23		24 Unit 2 Cont'd	25 Lab Handout MgO	26 Unit 2 Cont'd	27	28 Quiz 2 Comps I-2, I-3, I-4, III-1	29

February

Jan 30	Jan 31 Unit 3 Stoichiometry II Ch 3.1, 3.4-3.6	1 Lab # 5 Mass Relationships	2 Unit 3 Cont'd	3	4 Quiz 3 Comps II-1, II-2, II-3	5
6	7 Unit 4 Atomic Structure Periodicity Ch 5.1-5.14	8 Lab # 6 Hydrates	9 Unit 4 Con'd	10	11 Quiz 4 Comp III-2	12
13	14 Unit 5 Periodic Table Ionic Bonds Ch 1.3-1.4, 5.15, 6	15 Lab # 2 Paper Chromatography	16 Unit 5 Con'd	17	18 Quiz 5 Comp III-3	19
20	21 Unit 6 Covalent Bonds Ch 7.1-7.9	22 Lab # 3 Fractional Crystallization	23 Unit 6 Con'd	24	25 Quiz 6 Comp IV-1	26

March

Feb 27	Feb 28 Unit 7 Molecular Structure Ch 7.9-7.15	1 Lab #13 Molecular Models	2 Unit 7 Con'd	3	4 Unit 7 Con'd	5
6	7 Quiz 7 Comp IV-2	8 SPRING	9 BREAK	10 SPRING	11 BREAK	12
13	14 Unit 8 Nomenclature Ch 2.10	15 Lab Nomenclature Handout and Quiz	16 Unit 8 Con'd	17	18 Quiz 8 Comp VIII-1	19
20	21 Unit 9 Thermochemistry Chapter 8	22 Lab #14 Calorimetry	23 Unit 9 Con'd	24	25 GOOD FRIDAY Quiz 9 in ASC Comps VI-2, VI-3	26
27	28 Unit 10 Gas Laws Ch 9.1-9.3	29 Lab # 9 Molar Mass	30 Unit 10 Con'd	31	April 1 Quiz 10 Comps VII-1, VII-2	April 2

April

3	4 Unit 11 Gases Ch 9.4-9.9	5 Lab Handout Charles' Law	6 Unit 11 Con'd	7	8 Quiz 11 Comp VI-2	9
10	11 Unit 12 Liquids and Solids Ch 10	12 Lab # 41 Aspirin	13 Unit 12 Con'd	14	15 Quiz 12 Comps V-1, VII-3	16
17	18 Unit 13 Solutions I Ch 3.7-3.10, 11.1-11.4	19 Lab Handout Titration	20 Unit 13 Con'd	21	22 Quiz 13 Comps V-1, V-2	23
24	25 Unit 14 Solutions II Ch 11.5-11.10	26 Lab # 19 Freezing Point Depression	27 Unit 14 Con'd	28	29 Unit 14 Con'd	30

May

1	2 Quiz 14 Comp V-3	3 Review During Lab Period	4 Reading Day	5 Exams 151-02 12:00 PM	6 Exams 151-01 10:00 AM GRADUATION	7
---	--------------------------	-------------------------------------	------------------	-------------------------------	---	---

CHEMISTRY 151 (General Chemistry I)

COMPETENCIES

This course covers fundamental principles and laws of chemistry. Topics include measurement, atomic and molecular structure, periodicity, chemical reactions, chemical bonding, stoichiometry, thermochemistry, gas laws, and solutions. Upon completion, students should be able to demonstrate an understanding of fundamental laws and concepts as needed in CHM 152.

SUBCOMPETENCY I

The student will be able to solve problems dealing with the composition of matter.

- Task 1** Given the name (symbol) of an element, the student will be able to give the symbol (name) of the element.
- Task 2** Given one of the variables, the student will be able to convert grams to moles or from atoms (molecules) to moles.
- Task 3** Given the percentage composition, the student will be able to determine the empirical formula of a compound.
- Task 4** Given the empirical formula and molecular weight, the student will be able to determine the molecular formula of a compound.

SUBCOMPETENCY II

The student will be able to solve problems dealing with chemical reactions.

- Task 1** Given a skeleton equation, the student will be able to balance the equation.
- Task 2** Given a balanced chemical equation and amount of starting material(s), the student will be able to determine the theoretical yield of the specified product.
- Task 3** Given the actual yield and theoretical yield for a chemical reaction, the student will be able to determine the percent yield.

SUBCOMPETENCY III

The student will be able to solve problems dealing with atomic structure and the periodic table.

- Task 1** Given the complete symbol for an element, the student will be able to list the number of protons, electrons, and neutrons.
- Task 2** Given the complete symbol for an element, the student will be able to give the electronic configuration by subshell.
- Task 3** Given the Periodic Table, the student will be able to compare properties of the elements (atomic size, ionization energies, electron affinity, electronegativity, electronic configuration).

SUBCOMPETENCY IV

The student will be able to solve problems dealing with the union of atoms.

- Task 1** Given the formula of a compound, the student will be able to draw the Lewis electron dot structure for the molecule.
- Task 2** Given the Lewis electron dot structure, the student will be able to predict its molecular and electronic geometry, polarity, number of sigma (σ) and pi (π) bonds, and hybridization, if any, on the central atom.

SUBCOMPETENCY V

The student will be able to solve problems dealing with the concentration and colligative properties of solutions.

- Task 1** Given an amount of solute and solvent, the student will be able to express the concentration of a solution (molarity, molality, weight or volume percent, or mole fraction).
- Task 2** Given the concentration and volume of a solution, the student will be able to determine the concentration of the solution upon dilution to a given final volume of solution.
- Task 3** Given the freezing point of a solution and the amount of solute and solvent, the student will be able to determine the molecular weight of the solute.

SUBCOMPETENCY VI

The student will be able to solve problems dealing with thermochemistry.

- Task 1** Given an amount of substance and specific heat(s) for that substance, the student will be able to determine the heat change required to raise or lower the temperature of that substance a specified amount.
- Task 2** Given a table of heats of formation or bond energies and a balanced chemical equation, the student will be able to determine the enthalpy change (ΔH) for that reaction.
- Task 3** Given a chemical reaction and its enthalpy change, the student will be able to label the reaction as endothermic or exothermic.

SUBCOMPETENCY VII

The student will be able to solve problems dealing with the states of matter.

Task 1 Given any three of the variables (pressure, volume, temperature, or moles), the student will be able to determine the asked-for variable.

Task 2 Given the mass, volume, temperature, and pressure of a gas, the student will be able to determine the molecular weight of the gas.

Task 3 Given a phase diagram for a substance, the student will be able to predict the phase of the substance under given pressure and temperature conditions or predict points of phase change for the substance.

SUBCOMPETENCY VIII

The student will be able to demonstrate a knowledge of inorganic nomenclature.

Task 1 Given the name (formula) of a compound, the student will be able to give the formula (name) of the compound.

ASSESSMENT

Competency verification

Each task will be assessed individually during weekly quizzes. The student will have a minimum of three (3) chances to complete the verification of each task.

Quizzes

Quizzes will be given each week of the semester. Each quiz will cover approximately two hours of lecture-discussion classes. Quizzes account for 50% of the final grade. They can be taken with the aid of a calculator and periodic table.

SUBCOMPETENCY IX

Given a pre-lab discussion and laboratory textbook, the student will demonstrate acceptable laboratory techniques.

Task 1 Given a laboratory text, the student will be able to answer assigned problems on the advanced study assignment for each experiment.

Task 2 Given specific procedures, the student will be able to make quantitative measurements and draw conclusions of a quantitative or qualitative nature from these measurements.

ASSESSMENT

Assessment of the laboratory will be based on the precision and accuracy of the results obtained and the results of answers to the questions on the advanced study assignments. An average of 7 or more will verify the laboratory tasks. The laboratory will account for 25% of the final grade.

ASSESSMENT OF OVERALL COMPETENCY IN GENERAL CHEMISTRY I:

A comprehensive final exam will be given at the end of the semester. This exam will contain multiple choice questions in addition to the types of problems encountered on the weekly quizzes. This exam will account for 20% of the final grade. All tasks associated with subcompetencies will be included on the exam, and will be the students' final chance to complete them successfully.

In order to achieve competency for the course (a grade of C or better), the student must verify all tasks and achieve a score of at least 70% for all the work assigned during the semester (see page 2 for assignments and weighting).

If either of the above requirements are not met, a grade of less than C will be recorded based on the following:

- D — considered passing but not competent. This grade will be recorded for scores greater than 60% but less than 70% for all the work assigned during the semester, or if one or two competency verifications are not met..
- F — not a passing grade. This grade will be recorded for scores lower than 60% for all the work assigned during the semester, or if more than two competency verifications are not met.