Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: CHEM 108 **Year: 2020-2021**
Course Title: General Chemistry II **Credit Hours: 4**

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

Course Description

This course is a more thorough study of basic principles than CHEM 102. Topics covered include solutions, chemical equilibrium, acids and bases, electrochemistry, organic chemistry, thermodynamics, and kinetics. Laboratory experiments relate to the lecture topics, and are of a quantitative nature. Laboratory experiments are hands-on, wet-lab, performed in a traditional chemistry lab under supervision of a chemistry professor. Substantial outside preparation for the laboratories is required. A student may only apply credit earned in CHEM 102 or CHEM 108 toward degree requirements. **PREREQUISITES:** CHEM 107; RDNG 099 if required by placement testing; ENGL 099 or prior completion or concurrent enrollment in ESL 120, 121, and 122 (or prior completion of ESL 103) if required by placement testing. 4 Cr. (3 Lec., 2 Lab.)

Course Context/Audience

This course is part of the Liberal Arts Math/Science curriculum at TC3 and can be used to fulfill a laboratory science requirement. It is a required course in the Engineering Science A.S. degree program.

Basic Skills/Entry Level Expectations

Writing: W2 Student should have completed ENGL 099 (if needed). The course requires short written responses and/or short papers without documentation, particularly personal reflection or narrative.

Math: MC College level math skills – Course requires college level math skills. See course description for co-requisite and/or prerequisite requirement(s).

Reading: R2 Before taking this course, students must have a C or better in RDNG 099 or assessment indicating that RDNG 099 was not required.

Course Goals

As a result of successfully completing General Chemistry II, a student should be able to:

1. Demonstrate an understanding of solutions and perform calculations involving concentration units.
2. Define: acid, base strong and weak acids and bases, Ka, Kb, Kw, pH, and perform calculations involving these.
3. Explain the concept of chemical equilibria and how it is affected by various stresses.
4. Relate buffer action to chemical equilibria.
5. Demonstrate an understanding of spontaneity of a reaction and its relation to entropy, enthalpy and free energy and perform calculations involving these.

6. Balance redox equations and understand the relation between redox reactions and voltaic cells.

7. Demonstrate an understanding of reaction rate, catalysis, reaction mechanism, temperature and concentration changes on reaction rate.

8. Define organic chemistry and write structural formulas and names for simple organic compounds.

9. Recognize and properly use simple chemical equipment in the chemical laboratory to perform titrations and other basic procedures.

Course Objectives/Topics

Objective/Topic	# Hours
Topic 1. Solutions - Upon completion of this topic the student should be able to: 1. Define common concentration units and solve problems involving them; 2. Understand the principles of solubility; 3. Understand colligative properties and solve problems involving them.	9 Hours
Topic 2. Chemical Equilibrium - Upon completion of this topic the student should be able to: 1. Write equilibrium expressions for reactions; 2. State LeChatelier's principle and the equilibrium constant expression; 3. Determine the effect of stresses on chemical equilibria; 4. Solve problems involving chemical equilibria.	5 Hours
Topic 3. Acids and Bases - Upon completion of this topic the student should be able to: 1. Define: acid, base, Ka, Kb, Kw, pH, titration, buffer, weak acid, strong acid, weak base, strong base; 2. State the properties of acids and bases.	9 Hours
Topic 4. Spontaneity - Upon completion of this topic the student should be able to: 1. Define: spontaneity, entropy, enthalpy, free energy; 2. Determine the spontaneity of a reaction given the necessary thermodynamic information; 3. Predict the effects of temperature, pressure and concentration on spontaneity.	5 Hours
Topic 5. Electrochemistry - Upon completion of this topic the student should be able to: 1. Balance redox equations; 2. Diagram a voltaic cell and tell how the voltage is affected by various factors; 3. Understand the operation of an electrolytic cell; 4. Understand the role of electrochemistry in corrosion.	3 Hours
Topic 6. Kinetics – Upon completion of this topic, the student should be able to: 1. Define activation energy, catalyst, reaction mechanism, and rate-determining step; 2. Understand the effects of concentration and temperature on reaction rate.	3 Hours
Topic 7. Organic Chemistry - Upon completion of this topic the student should be able to: 1. Define organic chemistry; 2. Define: hydrocarbon, alkane, alkene, alkyne, aromatic, isomerism, functional group, optical activity; saturated, unsaturated, polymer, amino acid; 3. Write structural formulas and names for simple hydrocarbons and functional group compounds; 4. Understand the significance of organic chemistry to life and everyday living.	8 Hours
Topic 8. The Laboratory - Upon completion of this topic the student should be able to: 1. Perform titrations; 2. Construct a voltaic cell; 3. Make aspirin; 4. Determine a melting point and determine a molar mass by freezing point depression; 5. Follow proper safety procedures and techniques.	28 Hours

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to ➢ develop meaningful questions to address problems or issues. ➢ gather, interpret, and evaluate relevant sources of information. ➢ reach informed conclusions and solutions. ➢ consider analytically the viewpoints of self and others.	Students will be presented problems in which they have to use the basic principles of chemistry to get the solution. For example, students will be asked to calculate the molar mass of a substance from the amount the freezing point of a solution is lowered.
SOCIAL/GLOBAL AWARENESS OUTCOMES	**HOW DOES THE COURSE ADDRESS THE OUTCOMES** (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➢ Students will begin to understand how their lives are shaped by the complex world in which they live. ➢ Students will understand that their actions have social, economic and environmental consequences.	Students will learn about how chemistry is involved in and affects the physical world and society. For example, the role of acids and bases in biology and technology.

Instructional Methods
Classroom lectures
Reading the textbook
Answering questions and solving problems in the homework
Performing experiments in the laboratory

Methods of Assessment/Evaluation

Method	% Course Grade
Homework	5%
Major Tests	44%
Final Exam	24%
Lab	15%
Quizzes	12%

Text(s)

Chemistry: Principles and Reactions, William L. Masterton Cecile N. Hurley, and Edward J. Neth 7th ~~6th~~ Edition, © 2012 Brooks/Cole Publishing. (Required)

Student Solutions Manual, Maria Cecilia D. De Mesa and Thomas D. McGrath 7th ~~6th~~ Edition, © 2012 Brooks/Cole Publishing. (Required)

CHEM 108 Lab Manual, Bickford, Frank, Latest Edition, © (Required)

Bibliography

The Physics of Grandmother's Peerless Homemade Ice-Cream by Jearl Walker, Scientific American, © April, 1984, pp. 150-153.

Entropy and Its Role in Introductory Chemistry, by Franklin R. Bickford, Journal of Chemical Education, © April, 1982, pp. 317-318.

Entropy: Conceptual Disorder, by John P. Lowe, Journal of Chemical Education, © May, 1988, pp. 403-406.

Optical Activity, by Charles D. Mickey, Journal of Chemical Education, © June, 1980, pp. 442-444.

Other Learning Resources

Audiovisual No resources specified
Electronic No resources specified.
Other No resources specified