Chemistry 1020 General Chemistry II
Spring 2022

Instructor: Kevin Morris, DSC 178
Office Hours: T 10-12, R 1-3, F 9-10 and by appointment either in-person or on Zoom.
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Course Plan

Chemistry 1010 and 1020 provide a year-long introduction to college-level chemistry. Topics discussed in Chemistry 1020 include intermolecular forces, the properties of liquids, solids, and solutions, chemical kinetics and equilibrium, acids and bases, electrochemistry, chemical thermodynamics, and nuclear chemistry.

Chemistry 1020 can be taken without first taking Chemistry 1010. Students who did well in high school chemistry may begin with Chemistry 1020. Earning a C or above in 1020 results in retroactive credit for Chemistry 1010. Students who earned a five on the AP chemistry exam should receive credit for both Chemistry 1010 and 1020.

Texts

Chemistry, by OpenStax. A free pdf copy of the text is available on Schoology and at https://openstax.org/details/books/chemistry-2e.
Chemistry 1020 Laboratory Manual, notebook, and safety glasses

Class Meetings and Attendance

This semester we will cover chapters 10-17 and 21 in the textbook. Detailed weekly course outlines will also be provided. These outlines will include learning objectives, reading and problem assignments, and the material likely to be considered in each class. Weekly course outlines and homework assignments will be posted on Schoology.

Class periods will be used to develop further the assigned reading material and to present material not included in the text. There is no formal penalty for missed classes, but generally students who skip classes do poorly in the course. A portion of most class periods will be dedicated to small group problem solving exercises. In-class problems will be collected and corrected, but not be graded. The percentage of in-class assignments completed during the semester will count as one homework assignment.

Homework Assignments

Problem assignments are an important part of the course. Homework problems will be distributed in class and posted on Schoology each Monday and collected the following Friday. Work and intermediate steps must be shown to receive credit for quantitative homework problems. All homework assignments must be turned in on the due date unless prior arrangements are made. Homework problems constitute 25% of the final course grade. Working with others and with the tutor is encouraged.

Examinations

Three examinations and a comprehensive final exam will be given. Provisions will be made for make-up exams under extraordinary circumstances. Exam dates are listed below.

Exam I:	Wednesday, March 2nd
Exam II:	Wednesday, April 6th
Exam III:	Week of May 2nd
Final Exam:	Week of May 16th

Exams will contain both problems and conceptual questions. There may be multiple choice or fill-in-the-blank questions as well. Many exam questions will closely resemble homework or in-class assignments, therefore, reworking these problems is an excellent way to study. Review questions and their solutions will be provided in class and posted on Schoology before each exam. We will also have a cumulative final exam. If your final exam score is higher than your lowest test score, I will throw out the low test score and replace it with your score on the final.

Exams I and II will be given during our scheduled class period. Exam III will be a take home test distributed near the end of the semester and collected a week later. The textbook and lecture notes may be used on the take home test.

Help Outside Class

My office hours are listed above, however, feel free to stop by my office, send me an email, or give me a call whenever you need help. I am also happy to answer lab questions.

On-campus tutoring is still online. Go to https://www.carthage.edu/academics/advising-support/tutoring/ to sign up for an WCONLINE account and to schedule an appointment with a chemistry tutor.

Laboratory

The Chemistry 1020 laboratory program is tied closely to the lecture and lecture time may be devoted to a discussion of lab experiments. Laboratory experiments will be done in DSC 152 and 154. All lab sections meet for the first time the week of February 7th.

Grades

The course grade will be computed on the following basis.

Laboratory.....20%
Homework.....30%
Three Hour Exams and the Final.....50%

A grade of C- or higher in Chemistry 1020 is needed to enroll in Chemistry 2070.

Calculators

Bring a scientific calculator to all classes and labs**.** A scientific calculator app can be downloaded on most smart phones. A phone calculator can be used for in-class problems, but everyone must use a hand-held calculator on exams. Calculators should have the basic arithmetic functions plus log, ln, 10^x, e^x, 1/x, y^x, and square root keys. It should also be able to handle scientific notation. An inexpensive calculator that will carry out these functions will suffice.

Students with Disabilities

Carthage College strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, learning disorders and chronic medical conditions), please let me know immediately so we can privately discuss options. To establish reasonable accommodations, also register with Diane Schowalter in Learning Accessibility Services (dschowalter1@carthage.edu).

Personal Protective Equipment

Carthage's policies regarding face masks and social distancing can be found at https://www.carthage.edu/life-at-carthage/health-wellness-safety/covid-19/. Please read and comply with all listed policies and rules.

Academic Honesty

Students are expected to adhere to the College's code of academic conduct found at www.carthage.edu/current-students/community-code/student-conduct-system/. Academic misconduct includes copying, plagiarizing, duplicating, or misrepresenting work by others on exams and assignments. This includes material found on Chegg and other homework cheat sites. Academic dishonesty will be handled by assigning a grade of zero on the affected work for the first offence, and failure of the course on subsequent offences.

Lecture Schedule

Week of	**Topics**	**Textbook Chapter**
January 31	Intermolecular Forces	10
February 7	Properties of Liquids and Solids	10
February 14	Solubility and Solutions	11
February 21	Chemical Kinetics and Rate Laws	12
February 28	**Exam I** Integrated Rate Laws and Half Lives	12
March 7	Complete Kinetics Chemical Equilibrium	12, 13
March 21	Le Chatleier's Principle and Equilibrium Calculations	13
March 28	Acids, Bases and pH	14
April 4	Weak Acids and Bases **Exam II**	14
April 11	Buffer Solutions and Titration Curves	14, 15
April 18	Solubility Equilibria Entropy and the Second Law of Thermodynamics	15, 16
April 25	Free Energy Oxidation-Reduction Reactions	16, 17
May 2	Galvanic Cells and Electrolysis **Exam III**	17
May 9	Radioactivity and Nuclear Chemistry	21
May 16	**Final Exam** Wednesday, May 18th 10:30-12:30 am for CHM 1020-05 Tuesday, May 17th 1:00-3:00 pm for CHM 1020-08	

Chemistry 1020 Learning Objectives

1. To be able to identify intermolecular interactions and understand how these interactions affect the physical properties of liquids, solids and solutions.

2. To understand the properties of cubic unit cells and to be able to identify the phases present on a one-component phase diagram.

3. To be able to express solution concentration in units of molarity, molality, and mole fraction and to understand the physical basis for colligative properties like freezing point depression and osmotic pressure.

4. To understand how reactant concentration and temperature affect the rate of a chemical reaction.

5. To be able to solve integrated rate law problems and sketch reaction coordinates for endothermic and exothermic reactions.

6. To understand the concept of chemical equilibrium and to be able to solve equilibrium problems for solution or the gas phase reactions.

7. To be able to use Le Chatelier's principle to predict how changes in concentration, pressure, and temperature affect a reaction at equilibrium.

8. To be able to recognize acids and bases and predict the products of acid-base reactions.

9. To be able to calculate the pH of solutions containing strong/weak/conjugate acids and strong/weak/conjugate bases.

10. To understand how a buffer solution resists changes in pH and to be able to calculate the pH of a buffer solution.

11. To understand how the species in solution change during an acid-base titration and to be able to sketch an acid-base titration curve.

12. To be able to use K_{sp} values to solve solubility problems.

13. To understand the concepts of entropy and free energy and to be able to use ΔS and ΔG values to predict if a reaction is spontaneous.

14. To be able to balance oxidation-reduction reactions in acidic and basic solution.

15. To understand the operation of a voltaic and an electrolytic cell and to be able to use standard reduction potentials and the Nernst equation to calculate cell voltage.

16. To be able to write balanced nuclear equations for α, β, γ, and positron emission and understand how nuclear fission is used in nuclear power plants.