In the second quarter of General Chemistry we will explore Thermodynamics, Equilibria, Acid-Base chemistry and Kinetics. The thermodynamics, equilibria and kinetics of chemical systems will be of great importance in future classes such as organic chemistry and biochemistry. In this class we will answer the following questions: How do you know if a reaction will take place? How much of each reactant and product are present after a reaction takes place? What is the pH of a weak acid or weak base solution? How fast will a reaction take place? These are just a few questions we will answer in our continuing journey through general chemistry!

COURSE TOPICS

- Chapter 20 – Thermodynamics
- Chapter 17 – Equilibrium
- Chapter 18 – Acid-Base Chemistry and Equilibria
- Chapter 19 – Ionic Equilibria
- Chapter 16 – Kinetics

REQUIRED COURSE ITEMS

$110 (1 Semester) (ISBN-13 9781260477368)
or
$150.82 (2 years) (ISBN-13 9781260477375) Select “Digital” tab in link below

**I recommend you purchase directly from McGraw-Hill. Click above link and the select the “Digital Tab” to purchase Connect access. No paper text is required but you can buy a used copy of the 6th, 7th or 8th editions of the Silberberg text if you wish (The Connect Plus account is still required).**

Online homework: You will be required to participate in LearnSmart modules and submit problem sets via an online homework system called Connect. Instructions for enrolling in Connect are given on Canvas.

Calculator: An inexpensive calculator that has the capabilities for square roots, logarithms, and (exponential) scientific notation operations.
READINGs AND LEARN SMART ASSIGNMENTS. Assigned reading should be completed prior to class. The adaptive learning software LearnSmart will be used to reinforce the concepts from the book and online lectures. There will be a LearnSmart assignment due by the end of every class meeting from the 2nd week on (links on Canvas and Connect). The length and content of each assignment will vary between students depending on their understanding of the material. The more closely you read the material, the less time you are likely to spend on these assignments. LearnSmart assignments (6.25 points each) will not be graded based on right/wrong answers but on completion. Students are strongly encouraged to spend extra time using the features in the LearnSmart interface to study. There is no way to extend the deadline for these assignments so no late work can be accepted.

Connect course address: https://connect.mheducation.com/class/chem1020_2_winter2023

RECORDED LECTURES. Important concepts from readings will be highlighted during lectures. Periodically throughout lecture, questions will be posed and you pause the lecture and try to work through them before watching the step-by-step solutions. Recorded lectures are posted online on the Connect site and on the course YouTube channel. You can watch these lectures at a time that is convenient for you, and either before or after you complete the reading. It is highly recommended that you take careful notes, especially on any problems that are worked during the lecture. Lecture slides are available on Canvas under the “Files" tab to use for note taking or review.

YouTube Channel: https://www.youtube.com/channel/UCr7xcTSMwASzw6RUB02RuZQ

CLASS MEETINGS. This class follows a hybridized learning model. Instead of a traditional lecture, class meetings will be used as group office hours/study hall. Questions concerning material from the reading or lectures can be asked during this time. Students can also spend this time working through homework problems and can ask questions if they run into problems. I might briefly highlight some material from the reading/lecture that I feel is important at the beginning of these meetings but, in general, I will not have any formal presentation planned. What we discuss during this time will be driven by the students. For maximum benefit, reading and/or lectures should be completed before class meeting times. Attendance at these meetings is not required. In the event that remote learning is required at any point during the quarter, the class meeting Zoom address is: https://udenver.zoom.us/j/4915625194 (also found on Canvas)

PROBLEM SETS. Practicing problems is very helpful in the mastery of chemical concepts. Thus, problem sets will be assigned throughout the quarter using the on-line Connect system. These homework problems will be worth a total of 100 points and will be due weekly (by 10 pm Saturday nights, and 10 pm Wednesday nights during the week of an exam). The software is set to submit these problem sets at 10pm on the due dates and late work will not be accepted. This is the only way to allow practice attempts on the problems after the due date. If you need an extension, PLEASE ASK BEFORE THE PROBLEM SET IS DUE.

EXAMS. There will be two (2) two-hour exams given during the quarter and a two-hour, cumulative final exam. Dates for these exams are posted below on the lecture schedule. NO MAKE-UP EXAMS WILL BE ACCEPTED. There is one exception to this policy. If you will be out of town for a University sanctioned function (e.g., athletic team or music group), you are responsible for making arrangements with Dr. Swanson at least one week in advance to complete the exam prior to the scheduled date.
GRADERS. Final grades will be determined according to performance on exams, problem sets and completion of LearnSmart modules. There will be a maximum of 600 points for the course:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Hour Exams (100 points each)</td>
<td>200</td>
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<tr>
<td>Final Exam</td>
<td>200</td>
</tr>
<tr>
<td>LearnSmart Modules (6.25 points each)</td>
<td>100</td>
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<tr>
<td>Homework (10 points each)</td>
<td>100</td>
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<tr>
<td>Total Points</td>
<td>600</td>
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</tbody>
</table>

SUCCEEDING IN CHEMISTRY. Here are few helpful hints on how to succeed in this class:

**Do your best on the exams!**

How?
1. Read the material in the text book BEFORE class. Don’t get behind.
2. Follow check list of assignments (Canvas). Complete every assignment possible.
3. Attend class regularly. Take notes on content learned in lecture (Problems worked).
4. Be ready to ask questions… and ask them! Get help from course instructor!
5. Study with other students in the class.

SEEKING HELP. If you need help in the class, first be sure that you are following steps 1-3 listed above. If you still require assistance there are several places for you to go:

- **The instructor**: office hours are available before and after each class for one-on-one consultation. Contact the instructor via email or phone.
- **The Science and Engineering Learning center**: TAs are available throughout the week to answer questions on both lecture and lab material (See Below).
- **Peers (Study Groups)**: Take opportunities to help those around you and to ask them for help. You can learn a great deal from your fellow classmates.
- **Tutors**: The Chemistry Department office has a list of graduate student tutors.

Science and Engineering Center: Need extra help? The Science and Engineering Center is a collaborative space staffed by undergraduate and graduate learning assistants (LAs) trained to assist students with some first and second year biology, chemistry, physics, computer science and engineering courses. We offer support for both lecture and laboratory courses for chemistry, physics, and engineering courses and lecture only for computer science and biology. Our goal is to help students grow as problem solvers by assisting with homework sets, lab reports, and preparing for exams. The Science and Engineering Center is not a one-on-one tutoring center, but is rather a support system where students can get guidance from LAs as well as their peers. This center is open to all DU students. All services are free. Located in the north-west corner of the first floor of the Anderson Academic Commons (west of the writing center). See [http://portfolio.du.edu/sec](http://portfolio.du.edu/sec) for a complete schedule. Please also follow on Twitter for the most up-to-date announcements: 🚦 [@SELCatDU](http://portfolio.du.edu/sec)

LECTURE AND TESTING ACCOMMODATIONS. Every effort will be made, in complete confidence, to accommodate students diagnosed with a learning disability. Any student requiring these accommodations should inform Dr. Swanson the first week of class. For further information, please see DU’s Disability Services’ website at [http://www.du.edu/disability/dsp/index.html](http://www.du.edu/disability/dsp/index.html).
ACADEMIC DISHONESTY. Collaborative learning and teamwork are very important parts of science but cheating of any kind will not be tolerated. Each student is required to provide their own work on homework and exams. Copying an exam or homework (as well as any behavior that could be interpreted as copying) will result in no credit being given on the assignment or exam. Repeated offences will result in failure of the course and possible expulsion from the University. Please refer to the University’s honor code: https://www.du.edu/studentlife/studentconduct/honorcode.html

LECTURE SCHEDULE (Lecture Number, Problem Sets, LearnSmart, Exams)

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>READING</th>
<th>HOMEWORK</th>
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<tbody>
<tr>
<td>WEEK 1 – INTRODUCTION</td>
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<tr>
<td>Jan 3</td>
<td>Course Introduction</td>
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<td>Access Connect</td>
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<tr>
<td>5</td>
<td>1 - Thermo Review</td>
<td>6.1-6.6**</td>
<td>Problem Set 1</td>
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<td>WEEK 2 - THERMODYNAMICS</td>
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<td>10</td>
<td>2 - 2nd Law of Thermodynamics</td>
<td>20.1</td>
<td>LearnSmart 1</td>
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<td>12</td>
<td>3 - Calculating Entropy</td>
<td>20.2</td>
<td>LearnSmart 2</td>
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<td>14</td>
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<td>Problem Set 2</td>
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<td>WEEK 3 – FREE ENERGY</td>
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<td>17</td>
<td>4 - Free Energy</td>
<td>20.3, 12.3</td>
<td>LearnSmart 3</td>
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<td>19</td>
<td>5 - Intro to Equilibrium (K and Q)</td>
<td>17.1-17.3</td>
<td>LearnSmart 4</td>
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<td>Problem Set 3</td>
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<td>WEEK 4 – EQUILIBRIUM</td>
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<td>24</td>
<td>6 - Solving Equilibrium Problems</td>
<td>17.4-17.5</td>
<td>LearnSmart 5</td>
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<td>26</td>
<td>7 - Le Chatelier’s Principle and Direction</td>
<td>17.6, 20.4</td>
<td>LearnSmart 6</td>
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<td>28</td>
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<td>Problem Set 4</td>
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<td>WEEK 5 – INTRODUCTION TO ACIDS AND BASES</td>
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<tr>
<td>31</td>
<td>HOUR EXAM I (Covers Lectures 1-7)</td>
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<td>Date</td>
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<td>Feb 2</td>
<td>8</td>
<td>Acids and Bases in Water and pH Scale</td>
<td>18.1-18.2</td>
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<td><strong>WEEK 6 – ACID-BASE EQUILIBRIA</strong></td>
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<td>7</td>
<td>9</td>
<td>Bronsted-Lowry and Weak Acid Equilibria</td>
<td>18.3-18.4</td>
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<td>9</td>
<td>10</td>
<td>Weak Acids and Bases -Continued-</td>
<td>18.5-18.6</td>
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<td><strong>WEEK 7 – ACID-BASE TITRATION CURVES</strong></td>
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<td>14</td>
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<td>Salts, Leveling and the Lewis Acids</td>
<td>18.7-18.9</td>
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<td>16</td>
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<td>Acid-Base Buffers and Titration Curves</td>
<td>19.1-19.2</td>
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<td><strong>WEEK 8 – IONIC EQUILIBRIA</strong></td>
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<tr>
<td>21</td>
<td>13</td>
<td>Equilibria of Slightly Soluble Compounds</td>
<td>19.3</td>
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<td>23</td>
<td>14</td>
<td>Equilibria of Complex Ions</td>
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<td><strong>WEEK 9 – INTRODUCTION TO KINETICS</strong></td>
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<td>28</td>
<td><strong>HOUR EXAM II</strong></td>
<td>(Covers Lectures 8-14)</td>
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<td>Mar 2</td>
<td>15</td>
<td>Reaction Rates and the Rate Law</td>
<td>16.1-16.3</td>
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<td><strong>WEEK 10 – INTEGRATED RATE LAWS AND CATALYTIC MECHANISMS</strong></td>
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<td>7</td>
<td>16</td>
<td>Integrated Rate Laws/Kinetic Theories</td>
<td>16.4-16.5</td>
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<tr>
<td>9</td>
<td>17</td>
<td>Reaction Mechanisms and Catalysis</td>
<td>16.6-16.7</td>
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<td><strong>WEEK 11 – FINAL</strong></td>
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<td>14</td>
<td><strong>FINAL EXAM: 8AM to 9:50AM</strong></td>
<td>(Cumulative)</td>
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** Review Material