



General Chemistry II, a 5 unit class, is the second semester of a two semester series. The Summer 2018 class (section AA), lead by Prof. Nick DeMello (email [nick@chem220.com](mailto:nick@chem220.com)), is taught from 06/11/18 through 07/19/18 with a final exam on 07/19/18.

### Course Description:

This course is the continuation of CHEM 210 and is intended for students pursuing majors in physical sciences, biological sciences and engineering. The topics discussed include properties of solutions, kinetics, equilibrium, acid-base equilibria, thermodynamics, spontaneity, electrochemistry, nuclear reactions, and the chemistry of complex ions. The laboratory program extends the use of spreadsheet, graphical analysis and computer interfaced experimentation in acid-base titrations, rates of reactions, electrochemistry and volumetric analysis. A brief qualitative analysis scheme is also carried out in the laboratory program. This course is transferable to the UC and CSU systems.

### Prerequisites:

- Chemistry 210 or the equivalent is required.
- Math 120 or 123 (or equivalent). Chemistry is a math-intensive subject, every chapter will require algebra.
- Eligibility for ENGL 100.

### Required Materials:

- A Mastering Chemistry digital access code for online homework.  
Digital access for online homework is being delivered through our bookstore's Inclusive Access program. The digital materials will automatically be charged to your student account at a deeply discounted price.
- Textbook: Nivaldo J. Tro *Chemistry, a Molecular Approach*, 4<sup>rd</sup> Ed., Pearson / Prentice Hall.  
The textbook is available at the bookstore for \$49. This deeply discounted price is available as long as you don't opt out of the digital content. A digital copy of the textbook is available through Canvas.
- A spiral bound notebook for doing calculations in class, taking notes, and recording observations in lab (a single spiral bound notebook with three distinct sections is recommended).
- Pencils (2) with an eraser should be brought to every class.
- Internet access (online homework assignments will be required).
- No laboratory manual needs to be purchased, experiment and other lab activity descriptions will be posted online for students to download, print, and bring to class. No extra copies of the descriptions or worksheets will be available in the lab—be sure to printout and bring your copy.
- Laboratory safety goggles (can be purchased at the campus bookstore) are required for all lab experiments.
- A simple scientific calculator. The calculator must have scientific notation, log and square root functions. Anything more than that is a not needed and will likely slow you down. Keep it simple. Cell phones, PDAs, smart phones, laptops, and other personal electronics devices are not allowed during exams or quizzes and may be damaged by corrosive fumes or spills in a chemistry lab. Do not expect to use one in place of the required simple scientific calculator.

## Structure

### Lecture & Discussion:

Lecture will be held from **8:10am to 10:15am (2 hr 5 min) Mon, Tue, Wed & Thu in room 319 building 18**. Lecture attendance is required. You must sign the daily lecture attendance sheet to have your attendance recognized — not signing the sheet is the same as not attending class. Students missing more than two consecutive lectures, more than four lectures in total, or any lectures during the first two weeks of class, may be dropped from the class without notice.

Lectures will parallel the content in the class textbook. Prior to lecture, students are required to read the assigned textbook through the section indicated on the course schedule. Students are encouraged to write down any questions that occur during reading for discussion in lecture and to make note of definitions and formulas introduced in the text. The lecture will assume students have read the assigned sections.

### Homework:

Homework problems will be assigned for each chapter. Homework assignments will include questions and calculations similar to those found on the midterms and final exam. Most homework assignments will use the online Mastering Chemistry system.

Homework due dates are shown in Mastering Chemistry, roughly one per week. The Mastering Chemistry access is being delivered through Canvas. When you login to Canvas and click on any of the Mastering links, you will be taken to the content without having to register, setup an account or enter an access code. If you have any questions about this charge to your student account or if you wish to opt out and have your account deactivated, you will need to go to the bookstore and talk with someone at the counter.

## Laboratory:

Lab meetings will be held from **10:45am to 3:00pm (4 hr 15 min) Mon, Tue, Wed & Thu, in room 311 building 18**. Lab attendance is required.

Students must sign the daily lab attendance sheet to have attendance recognized — not signing the sheet is the same as not attending class. This is a separate sign in sheet from the lecture attendance sheet. It is not possible to make-up missed lab activities. Students absent on the day of an activity will receive a zero score for that activity. Two or more absences from lab may result in the student being dropped without notice.

Lab sessions will include chemical experiments, skill workshops, and other activities. Descriptions of each days lab activity are listed on the class website by date. Some lab activities may span two lab periods. Students must review these descriptions, complete any pre-lab questions or preparations prior to lab, and bring printouts of experimental descriptions and/ or worksheets to the corresponding lab session. Many lab activities may begin with a pre-lab quiz and require a post lab report. Students unable demonstrate proper preparation may not be allowed to participate in that days lab activity.

Students will work in pairs, groups of four, or individually depending on the activity. Student pairs will be selected on the first day of lab and will share an assigned lab drawer for the semester. Each pair will be responsible for the equipment in their drawer. Each team member is individually responsible for recording all experimental data, including printing out their own copy of any spectra or other results produced in the lab. Each student is individually responsible for producing and submitting their own report for each experiment.

Chemistry labs are dangerous. The chemicals we employ and study are interesting because of their tendency to change one substance into another. In other words, almost every chemical you work with is either corrosive, toxic, volatile, mutagenic, combustible or otherwise dangerous. Students are required to view a safety video detailing the college safety policies and achieve a passing grade on the subsequent safety quiz before conducting any experiments. Students who disregard any laboratory safety policy at any time in the semester will be asked to leave the lab and will earn no points for that activity. At the discretion of the instructor, half or all points may be removed from the students lab safety score as a one time warning instead.

Safety policies include (but are not limited to):

- Safety goggles must be worn at all times in the lab, unless the instructor specifically tells you otherwise.
- Students must wear clothes that adequately cover legs, arms, and feet. No open toed shoes, no shorts, etc.
- No draping or baggy clothing. Long hair must be tied back. Most lab fires start in loose hair or clothing.
- No food or drink is permitted in the lab or in the halls outside the lab. While there is adequate ventilation in the labs for most practices, many foods readily absorb chemical vapors and can become toxic in a lab environment.

Reports and other assignments are due at the start of the lab period following completion of the activity, unless your instructor specifies otherwise. Students may submit lab reports only for activities in which they participated. Missed labs will result in zero points for that activity.

## Exams:

There are two midterm exams and a final exam. Midterm exams will be held during lab period (see the class schedule for dates). Students are required to bring a scientific calculator, pencils (2), and an eraser to each exam. No scantron forms or blue books are required. Notes are not allowed during exams. A periodic table will be provided. A missed midterm exam will result in zero points for that exam. There are no make-up exams. Exams cannot be taken early.

The Final Exam is from **10:45am to 3:00pm on Thursday July 19th in room 311, building 18** (lab room). The final exam is comprehensive and is required. Not taking the final exam will result in a failing grade for the course. This exam cannot be made up or taken early. There are no exceptions.

## Grading

There is no curve. There is no extra credit. Grades are based on a percentage of total points achieved to total points possible. Points are earned for exams, homework, lab workshops, lab experiments and lab safety. The total points expected to be offered this semester is approximately 1,000 — broken down as follows.

240 pts	Midterm Exams (2 exams; 120 pts each)	27%	Exams 52%
160 pts	Final Exam (comprehensive; 160 pts)	18%	
60 pts	Workshop Practice Tests (best 6 scores; 10 pts each)	7%	Exercises 48%
210 pts	Homework (7 chapters; 26-32 pts each)	23%	
220 pts	Lab Experiments (best 10 scores; 22 pts each) (includes 4 pt pre-lab quiz & 18 pt post-lab report)	24%	
10 pts	Lab Safety Quiz	1%	
900 pts		100%	

Students who earn 90% or more of the available points will receive an A grade. Students who earn less than 90% but 80% or more of available points will receive a B grade. Students who earn less than 80% but 70% or more of available points will receive a C grade. Students who earn between 70% and 55% will receive a D grade.

Where allowed by campus policy, a "+" prefix will be attached to B and C grades when a student earns points in the top half of each respective range. Students who earn less than 55% of the total possible points or who fail to take the final exam will receive a failing grade for the course. Final Grades will be posted in WebSMART approximately 14 days after the final exam. Final grades are not available prior to being posted in WebSMART.

## Resources

### Chem Website 220:

Announcements, forums, schedules, outlines, study aids, lab assignments, and other resources can accessed from the class page in Canvas. Mastering Chemistry will be used for most homework and can be accessed from Canvas. The lab experiments can be accessed from the online lab manual (URL below). A public class website can be accessed from the URL below (after week 3 this URL will redirect to the Canvas login page).

Chem website 220 (public) : <http://chem220.com>

### Outlines:

Chapter topics lists are posted on the class website. These outlines iterate the specific topics and learning objectives we intend to present and teach. In class activities and take-home assignments will focus on helping students achieve these objectives. Additional topics may be added to the outline during the semester and not all will be tested for on in any given assessment. Students are encouraged to use this course outline in preparing for lecture, reviewing chapters covered, preparing for exams, and determining if this class meets their personal goals in studying chemistry.

### Student Learning Center:

The learning center provides computers with internet access. The student learning center is a well lit, distraction free environment ideal for studying alone or in groups. MESA provides **free** chemistry tutoring through the student learning center. Students are strongly encouraged to explore this valuable resource.

### Students with Disabilities:

It is the policy of Cañada College to provide reasonable accommodations for individuals with disabilities pursuant to federal law and the college's commitment to equal educational opportunities. It is the responsibility of the student to present documentation to the instructor which clearly outlines all requested accommodations. Special needs students should contact the disability resource center at (650) 306-3259 for disability assessment and to learn of available resources.

## Notices

### About transitioning into a collegiate environment.

"We teach rose bushes and ivy where to grow. Infants, toddlers, and children are taught right from wrong and other essential lessons. Useful skills, necessary limits, and entertaining tricks are taught to service animals and pets. Teaching is acting upon another to cause them to know something. Out of necessity teaching is generally done without a subjects knowledge, regardless of their consent, and often against their will.

As children become adults, the educational process for them changes. We teach less and ask students to learn more. Required lessons are slowly replaced with opportunities to explore and seek out whatever knowledge a student may choose to make their own. Eventually teaching ends and young adults graduate from even our highest schools, but opportunities to learn may continue. The collegiate environment is not a school. There are no teachers here and enrollment is not required.

If you take this class, you are doing so of your own free will. You are choosing to attempt to master an extremely challenging subject. The faculty and staff of this college will do our best to assist you in your challenge. But passive attendance and simply doing as you are told will not be sufficient. The knowledge proffered here must be taken up, considered, and made your own. You face a difficult challenge. Success is not guaranteed, regardless of effort or intent.

This college also offers you the benefit of having your knowledge tested, graded and certified if you meet a level of mastery determined by the state and college. This certification is not a reward or payment for effort. It is recognition of learning, of what knowledge you succeed in making your own. It is a worthy achievement that few will accomplish. It is something to be proud of."

### Academic Integrity Policy (from the Cañada College Catalog)

*"As members of the college community, students at Cañada are expected to demonstrate integrity in all academic endeavors. Students are evaluated on their own merits, so they should protect academic integrity at Cañada College and be proud of their achievements.*

*General principles of academic integrity include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others and to avoid using another's work as one's own. Faculty, with the full support of the College, has the right to take standards of academic integrity into account when assigning grades. All students are expected to understand and abide by these principles.*

*Any act which gains or is intended to gain an unfair academic advantage or which compromises the integrity of the academic standards of the college may be considered an act of academic dishonesty."*

Common forms of academic dishonesty are: plagiarism, fabrication and cheating. Refer to the Cañada College Catalog for detailed definitions. Any student found pursuing any form of academic dishonesty will be subject to disciplinary action according to the guidelines described in the College Catalog.

### Student Learning Outcomes

Upon successful completion of Chem 220 course, a student should be able to:

1. Apply  $K_a$ ,  $K_b$ ,  $pK_a$ ,  $pK_b$ , and pH concepts on complex equilibrium calculations.
2. Construct simple voltaic cells and perform calculations involving reduction potentials.
3. Describe enthalpy, entropy and free energy as it applies to spontaneous processes.
4. Discuss chemical equilibrium and apply the concept to acid-base reactions and buffer solutions.



Week	Date	Day	Lecture Topics (8:10-10:15 AM)	Textbook Chapter	Lab Activity (10:45-3:00 PM)
Week 1	11-Jun	M	SOLUTIONS – SOLUTION FORMATION – FACTORS IN SOLUBILITY	INTRO/13	REQUIRED SAFETY TRAINING, EQUIPMENT INTRODUCTION & TRAINING & LAB CHECK IN
	12-Jun	T	– CONCENTRATION & DILUTION – MEASURING CONCENTRATION	13	Exp#01: Intro Spectroscopy
	12-Jun	W	<i>Refund Cut-off (last day to withdraw with full refund)</i>		
	13-Jun	W	– COLLIGATIVE PROPERTIES – COLLOIDS & SUSPENSIONS	13	Workshop: Solutions
	14-Jun	Th	KINETICS – RATE OF CHANGE – RATE LAWS	14	Exp#02: Freezing Point Depression
	17-Jun	W	<i>Last date to withdraw without a 'w' on transcript</i>		
Week 2	18-Jun	M	– ACTIVATION ENERGY – TRANSITION STATES	14	Workshop: Kinetics
	19-Jun	T	– REACTION STEPS – CATALYSIS	14	Exp#03: Crystal Violet Decomposition
	20-Jun	W	EQUILIBRIUM – REVERSIBLE REACTIONS – INTRODUCING EQUILIBRIUM	15	Workshop: Ch13-14 Review
	21-Jun	Th	– HETEROGENEOUS EQUILIBRIUM – REACTION QUOTIENTS	15	EXAM #1 (Ch 13-14)
Week 3	25-Jun	M	– ICE TABLES – SOLVING EQUILIBRIUM EXPRESSIONS	15	Exp#04: Determination of $K_{EQ}$
	26-Jun	T	ACIDS – PROPERTIES & HISTORY – ACID STRENGTH	16	Exp#05: Le Chatelier's Principle
	27-Jun	W	– AUTO-IONIZATION OF WATER – PSCALE REPRESENTATION	16	Workshop: Equilibrium (ICE Tables)
	28-Jun	Th	– SOLUTION STRENGTH – STRUCTURE & CLASSES OF ACIDS	16	Exp#06: pH of Acids, Bases & Salts
Week 4	2-Jul	M	DISSOCIATION – TITRATION TECHNIQUES – WEAK ACIDS & BASES	16/17	Exp#07: Titration & Standardization
	3-Jul	T	– BUFFER SOLUTIONS – BUFFER CAPACITY & pH CURVES	17	Workshop: Ch15-16 Review
	4-Jul	W	<i>Independence Day Holiday – Campus Closed</i>		
	5-Jul	Th	– SOLUBILITY – PRECIPITATION	17	EXAM #2 (Ch 15-16)
Week 5	9-Jul	M	– QUALITATIVE ANALYSIS – COMPLEX IONS	17	Exp#08: Buffer Solutions
	10-Jul	T	THERMO – EFFICIENCY & SPONTANEITY – ENTROPY	18	Exp#09: Solubility ( $K_{sp}$ )
	10-Jul	W	<i>Last date to withdraw with a 'w' on transcript.</i>		
	11-Jul	W	– HEAT TRANSFER – CHEMICAL POTENTIAL	18	Workshop: Solubility
	12-Jul	Th	– FREE ENERGY OF REACTION – IRREVERSIBILITY	18	Exp#10: Free Energy (Borax)
Week 6	16-Jul	M	E-CHEM – OXIDATION STATES – REDOX EQUATIONS	19	Workshop: Free Energy
	17-Jul	T	– CHEMICAL CELLS – STANDARD POTENTIALS	19	Exp#11: Electrochemistry
	18-Jul	W	– FINAL EXAM REVIEW –		
	19-Jul	Th	<b>FINAL EXAM (Comprehensive) – July 19th</b>		

Grades

(Final class grades posted through webSmart about one week after final exam)

There are no make-up Exams, Quizzes or Lab Activities.  
Schedule subject to change. (rev 20180610 NCD)