

## Chemistry 1B: General Chemistry Section 01 and Section 02

### Winter 2018

**Instructor:** Dr. Megan Brunjes Brophy

**Office:** SC1220

**E-mail:** [brophymegan@fhda.edu](mailto:brophymegan@fhda.edu)

**Phone Number:** 408-864-8338

**Course Webpage:** Canvas

**Office Hours:** Monday 12 – 2 pm, Wednesday 12 – 2 pm

#### Class Meetings

Lecture: MWF 10:30 am – 11:20 am, MLC105

Lab Section 01: MW 7:30 am – 10:20 am, SC2204

Lab Section 02: MW 2:30 pm – 5:20 pm, SC2204

#### Syllabus Statement

This course syllabus is a contract. Please read it carefully and completely in its entirety before asking me any questions regarding the course schedule, content, requirements, grading, etc. You are expected to adhere to the De Anza College Student Code of Conduct Administrative Policy 5510 at all times.

This class is divided into two separate instructional periods: a lecture period devoted to the primary course material and a lab period for conducting lab experiments. Everyone will have the same lecture period, but a different lab period depending on which section you are enrolled in. At De Anza College, the lab and lecture may not be taken as separate courses under any circumstances.

#### Course Description

Chemistry 1B is the second quarter of a year-long introduction to the principles of general chemistry, and a direct continuation from Chemistry 1A. Chemistry 1B will constitute an investigation of intermolecular forces and their effects on chemical and physical properties, investigation of reversible reactions from the standpoints of kinetics, thermodynamics, and equilibrium, as well as investigation and application of gas laws and kinetic molecular theory.

#### Prerequisites

Chemistry 1A with a grade of C or better. EWRT 211 and READ 211 (or LART 211), or ESL 272 and 273.

#### Hours

Three hours lecture and six hours laboratory will be spent in class. You should expect to spend an additional 8-12 hours a week studying and working on class assignments.

#### Attendance Policy

Your punctual attendance is expected at all lecture and laboratory sections of the course. If you will have to miss class for any reason, let me know by e-mail as soon as possible.

#### Textbook and Materials

1. *Chemistry: The Molecular Nature of Matter and Change*, 8<sup>th</sup> edition by Silberberg and Amateis. You are strongly encouraged to purchase this textbook from the De Anza College bookstore.
2. A scientific or graphing calculator. Phones may not be used as a calculator on exams or quizzes. I recommend the TI-30XS calculator which is available from multiple retailers.

3. The Chemistry 1B laboratory manual, available online at the De Anza Chemistry Department webpage: <https://www.deanza.edu/chemistry/Chem1B.html>
4. A dedicated laboratory notebook. A laboratory notebook with carbon copies, available from the De Anza College bookstore, is *strongly* recommended. You may purchase a bound composition notebook; however, keep in mind that you will be required to turn in copies of your lab notebook pages.
5. Approved laboratory safety goggles (not safety glasses), available from the De Anza College Bookstore.
6. Disposable latex or nitrile gloves (*recommended*).
7. Stapler and staples.

## Resources

1. Math, Sciences, and Technology Resource Center (MSTRC) Tutoring. The MSTRC offers tutoring for the Chemistry 1 sequence and is located in room S43 in the S-squad. Their website is: <https://www.deanza.edu/studentsuccess/mstrc/>
2. Disability Support Programs Services. The mission of DSPS is to ensure access to the college's curriculum, facilities, and programs. In particular, DSPS can help you get extended time on examinations. Their website is: <https://www.deanza.edu/dsps/>

## Study Tips

1. Complete the assigned reading before coming to class. Review 1A topics that are unfamiliar.
2. Take *handwritten* notes during class and review your notes regularly. Write down any questions you have and bring them to class or office hours.
3. Do a little bit every day. Do not leave homework assignments until the last minute.
4. Join a study group. Work on problem sets together. The best way to learn the material is to teach it to somebody else.
5. If you feel that you are a poor test-taker, *complete and turn in all other assignments on time* in order to pass the class.
6. Take care of yourself! Stay well-rested and drink water.

## Important Dates

<b>Add Day:</b>	January 20, 2018	Last day to <i>add</i> .
<b>Drop Day:</b>	January 21, 2018	Last day to <i>drop</i> the course without a withdraw being recorded.
<b>Withdraw:</b>	March 2, 2018	Last day to <i>withdraw</i> from the course.

**If you drop or withdraw from the course, you *must* check out of your lab locker by the last lab period.**

## Exam Dates and Tentative Content

There will be three midterm exams and one cumulative final exam. The date of the final exam is determined by the college and cannot be moved.

January 29, 2018	Exam 1	Chapters 12 and 5
February 23, 2018	Exam 2	Chapters 16 and 17
March 16, 2018	Exam 3	Chapters 18 and part of 20
March 28, 2018	Final Exam	Cumulative

Additionally, there will be a lab final on March 21 in your lab section.

**Lab Report Due Date**

You will write 1 formal lab report this quarter, worth a total of 5% of your grade. Formal lab reports must be prepared in a word processor such as Microsoft Word or Google Docs.

Green salt

February 21, 2018

**Grading Breakdown and Grade Scale**

To succeed in this course, you will need to exhibit consistent and sustained effort throughout the quarter. This will be demonstrated through homework assignments, laboratory preparation and data analysis, and examinations.

Lecture	70% of total grade
Homework	17%
Midterm exams	30%
Final	20%
Participation	3%
Lab	30% of total grade
Pre-lab	5%
Lab data and participation	5%
Post-lab worksheets	5%
Lab report	5%
Lab final	8%
Clean-up	2%

Final %	Grade <sup>1,2</sup>
>100.0	A+
91.0 – 100.0	A
89.0 – 90.9	A–
85.0 – 88.9	B+
81.0 – 84.9	B
79.0 – 80.9	B–
75.0 – 78.9	C+
70.0 – 74.9	C
63.0 – 69.9	D+
55.0 – 62.9	D
<55%	F

<sup>1</sup>If your average in either the lab or lecture portion of the course is less than 55%, you will receive an F as a final grade.

<sup>2</sup>A+ grades will be given to students who demonstrate excellence in the following three areas: lecture, lab and class participation.

**Lecture (70%)**

Your attendance and active participation is expected at every lecture period. ***Due to the high number of students wishing to enroll in the course, any unjustified absences during the first two weeks of class will result in you being dropped from the course.*** Absences may be excused in case of a verified emergency (e.g. doctor's note or police report). If you know that you will not be able to attend lecture for any reason, let me know by email right away (even if only 5 minutes before class). The lecture participation grade (5%) must be earned through active engagement during class. Late arrivals and early departures are distracting for the whole class (and me!), so arrive on time and stay for the whole class period. I strongly encourage taking your own notes in lecture. Computers are not necessary during lecture. Do not use your computers for non-course related activities during lecture. Put your phone on silent or Do Not Disturb while you are in class. If you must take a phone call in case of emergency, quietly leave the room before answering the phone.

**Homework (17%)**

Consistent practice is an essential component of learning, and homework questions will often be similar to exam questions. Homework assignments for this quarter will be posted on the course webpage and due in lecture on the days indicated in the syllabus. Homework will be evaluated based on completion and accuracy. All homework will be given a grade from 1 – 5. All questions should be clearly numbered, answered in order, and final answers should have a box drawn around them. Homework that is sloppy, out of order, or in which the answers are not clearly boxed will be returned ungraded. Late homework

assignments will not be accepted. If you know you will have to miss class on a day that homework is due, you may make arrangements to with me to turn the assignment in early.

5 (Excellent): All questions have been completed, and most are answered correctly. All work is shown, and conceptual questions are explained well and in detail.

4 (Good): All questions have been answered, but there are minor systematic errors. Conceptual questions are not fully explained.

3 (Okay): All questions have been answered, but many answers are incorrect and some work is not shown.

2 (Needs work): Assignment is incomplete, and significant work is not shown.

1 (Incomplete): Only some of the homework questions have been answered.

### Exams (30%)

There will be three midterm exams, each worth 10% of your final grade. Early and late exams will not be administered, and missing an exam **will result in a zero without documented proof of a medical or legal emergency** (e.g. hospitalization or car crash). If you need any accommodations for exams, DSPS will be able to notify me through Clockwork.

Exams will consist of short answer questions with the opportunity for partial credit. You must show your work in order to receive credit for any answer. I am more interested in how you think about a problem than your final answer. You will be asked to demonstrate your conceptual understanding of the material and apply those concepts in an algebraic context and solve quantitative problems.

### Final (20%)

The final exam will be cumulative. The final exam will be administered on **Wednesday, March 28<sup>th</sup> from 9:15 am – 11:15 am**. This date and time are determined by De Anza College and cannot be moved under any circumstances. If you cannot take the final at this time, you should not enroll in the class. The final will not be administered at an alternative time under any circumstances. You must take the final to pass the course.

### Lab (30%)

Chemistry is an experimental science, and the laboratory is a major component of the course. De Anza College does not offer make-up labs, and you **must attend the laboratory section that you are registered for** to complete the required labs. Everyone gets one excused absence with no grade penalty. To receive this excused absence, you must contact your instructor ASAP to explain your absence from lab. After 24 hours, you will not be able to excuse this absence and you will receive a zero for all associated assignments. A second absence, regardless of the circumstances of your first absence, will result in a zero for the lab and all associated assignments for that lab. After a third lab absence, you will automatically receive an "F" in the course.

Your timely attendance is expected at every lab. The beginning of each lab period is reserved for lab lecture. The lab lecture is a required component of the laboratory section and will include essential safety information. **If you miss lab lecture, you will not be permitted to complete that lab and you will receive a zero for all related assignments** (e.g. Pre-lab, lab data, and lab analysis).

You must clean up your work area before leaving each lab. Failure to do so will result in a loss of points for that lab. Before you leave lab, check-out with me. You will not receive credit for the lab unless I have signed your data.

### **Pre-lab (5%)**

Pre-labs must be prepared in your laboratory notebook before the start of your laboratory section. Each pre-lab is worth 20 points. I will check your pre-lab at the start of class. If it is not complete, you will automatically lose 10 of the available points. You may complete your pre-lab after lab lecture for the remaining 10 points. **You are not permitted to work on your pre-lab during lab lecture.** If you complete the pre-lab during lab lecture, you will receive zero points for the pre-lab.

### **Lab Data (5%)**

Each wet-lab day is worth a total of 20 points: 10 points for data recorded and 10 points for general conduct and lab citizenship. **Data collected during the lab period must be recorded in your laboratory notebook.** You may recopy your data into a clean table in your lab notebook later if you wish. You will not receive credit for any data written on a worksheet or separate piece of paper. Before you leave lab for the day, have me check off on your data in your lab notebook for the available points.

### **Lab Analysis (5%)**

Data analysis worksheets will be posted on the course webpage. The precise nature of the assignment and the number of points available will vary. All worksheets must be turned in with the carbon copies from your lab notebook pages stapled to the back. Due dates will be announced in class and on Canvas.

### **Lab Reports (5%)**

You will write one formal lab report for Chemistry 1B for the green salt lab (Lab B7). Lab report guidelines will be available on Canvas. All lab reports must be printed and **must be turned in at the beginning of class on the day they are due.**

### **Lab Final (8%)**

There will be one lab exam in this course. The lab final will be an open lab-notebook exam, and you may refer to any information that is handwritten in your lab notebook. Extra pages (either printed or handwritten) may not be inserted. The final will cover material, calculations, and analysis related to your laboratory experiments.

### **Clean-up (2%)**

Each student is required to sign up for two lab periods in which they will be responsible for after-lab clean-up. This involves staying to end of lab, making sure the common lab areas and balance area is clean, the waste bottles are closed, etc. In addition, each student is responsible for cleaning their own materials and work area.

### **Academic Integrity**

Students are expected to adhere to the policy on academic integrity that is outlined in the De Anza College manual (<https://www.deanza.edu/studenthandbook/academic-integrity.html>). I expect all submitted work to represent your own understanding of the material. Cheating, copying, plagiarizing, etc. will not be tolerated, and the minimum consequence will be receiving a zero on that assignment. All laboratory data used in calculations and reported in lab reports must be collected by each student. Multiple instances of academic dishonesty may result in failing the course.

Copying any assignment from another student is cheating. If I see you copying an assignment, both students will receive a zero on that assignment.

**Lecture Schedule, Assigned Readings, and Homework Due Dates**

Chemistry 1B will cover material presented in chapters 5, 12, 16, 17, 18 and 20 of Silberberg. We will also review Chemistry 1A topics presented in chapters 10 and 6 throughout the quarter.

Every effort will be made to keep to the lecture schedule below. If we fall significantly behind this schedule, the content of the exams will be adjusted to reflect the material that we covered in class. Exam dates will not be modified except in cases of force majeure.

Week	Date	Day	Lecture Topic Readings	Homework
1	1/8	M	Phases of Matter: Liquid, Solids and Gases <i>Silberberg 5.1, 12.1</i>	
	1/10	W	Introduction to Kinetic Molecular Theory and Properties of Gases <i>Silberberg 5.5, 5.2</i>	
	1/12	F	Gas Laws: Boyle's Law, Charles' Law, Avogadro's Law and the Ideal Gas Law <i>Silberberg 5.3, 5.4</i>	HW 0 due (1A review)
2	1/15	M	<b>MLK Day – No classes</b>	
	1/17	W	Kinetic Properties of Gases <i>Silberberg 5.5</i>	
	1/19	F	Intermolecular Forces and Properties of Water <i>Silberberg 12.3, 12.5</i>	HW 1 due
3	1/22	M	Intermolecular Forces and Properties of Water <i>Silberberg 12.3, 12.5</i>	
	1/24	W	Phase Changes and Review of Enthalpy <i>Silberberg 12.2, 6.2, 6.4-6.6</i>	
	1/26	F	Phase Changes and Review of Enthalpy, continued <i>Silberberg 12.2, 6.2, 6.4-6.6</i>	HW 2 due
4	1/29	M	<b>Exam 1: Review, Chapters 12 and 5</b>	
	1/31	W	Chemical Kinetics, Reaction Rates, Reaction Mechanisms and Transition States <i>Silberberg 16.1-16.2, 16.6, 16.7</i>	
	2/2	F	The Rate Laws and Integrated Rate Laws <i>Silberberg 16.3</i>	
5	2/5	M	Kinetics, Continued <i>Silberberg 16.4, 16.5</i>	HW 3 due
	2/7	W	Equilibrium <i>Silberberg 17.1, 17.2</i>	
	2/9	F	Equilibrium <i>Silberberg 17.3, 17.4</i>	
6	2/12	M	Equilibrium: ICE Box Method <i>Silberberg 17.5</i>	
	2/14	W	Equilibrium: Le Chatelier's Principle <i>Silberberg 17.6</i>	
	2/16	F	<b>President's Day Holiday – No classes</b>	
7	2/19	M	<b>President's Day Holiday – No classes</b>	
	2/21	W	Kinetics and Equilibrium Review and Practice	HW 4 due

	2/23	F	<b>Exam 2: Chapters 16 and 17</b>	
8	2/26	M	Acids and Bases: Definitions and Review <i>Silberberg</i> 18.1-18.2; 4.1, 4.2, 4.4; 18.9	
	2/28	W	Proton Transfer and Polyprotic Acids <i>Silberberg</i> 18.3, 18.4	
	3/2	F	Weak Acids and Bases <i>Silberberg</i> 18.5-18.6	
9	3/5	M	Acid-base Properties of Salts <i>Silberberg</i> 18.7	HW 5 due
	3/7	W	Thermodynamics: Introduction to Free Energy and Enthalpy Review <i>Silberberg</i> 6.1, 6.2, 6.5, 6.6; 20.1, 20.3	
	3/9	F	Thermodynamics: Entropy <i>Silberberg</i> 20.1	
10	3/12	M	Thermodynamics: Reaction Entropy <i>Silberberg</i> 20.2	
	3/14	W	Thermodynamics: Reaction Entropy <i>Silberberg</i> 20.2	HW 6 Due
	3/16	F	<b>Exam 3: Chapters 18 and 20</b>	
11	3/19	M	Thermodynamics: Spontaneous Reactions <i>Silberberg</i> 20.3	
	3/21	W	Thermodynamics <i>Silberberg</i> 20.4 <b>Lab Final (in your lab section)</b>	
	3/23	F	Review and Practice Problems	HW 7 due <i>All work due by noon.</i>
12	3/28	W	<b>Final Exam</b> <b>9:15 am – 11:15 am***</b>	

**Lab Schedule**

The expected laboratory schedule for winter 2018 is given below. Precise pre-lab and post-lab assignments are subject to change. Any changes will be announced *in class*. Please note that you *must* check out with me before you leave lab for the day. This will ensure that you get lab points for the day.

In addition to the pre-labs and calculations listed below, you will write 1 formal lab reports this quarter due on February 21.

Week	Date	Day	Lab	Lab notebook and data analysis ✓ Data for check-out
1	1/8	M	Syllabus and check-in	
	1/10	W	B1: Molar volume of a gas (day 1)	Safety contract due B1 Pre-lab due
	1/12	F	-	-
2	1/15	M	<b>No classes</b>	
	1/17	W	B1: Molar volume of a gas (day 2)	
	1/19	F		-
3	1/22	M	B2: Vapor pressure (day 1)	B2 pre-lab due
	1/24	W	B2: Vapor pressure (day 2)	Day 1 calculations due
	1/26	F	-	
4	1/29	M	B7: Green salt (day 1) Synthesis and recrystallization	B7 Pre-lab Part I and Part II Procedure
	1/31	W	B7: Green salt (day 2) Titration	Part III Procedure Due ✓ Mass of crystals ✓ Titration data tables ✓ Percent oxalate calculations
	2/2	F		-
5	2/5	M	B7: Green salt (day 3) Spectrophotometry	Part IV Procedure Due Part III Data Analysis Due ✓ Absorbance tables ✓ Percent iron calculations
	2/7	W	B7: Green salt (day 4) Hydrate	Part V Procedure Due Part IV Data Analysis Due ✓ Mass data tables ✓ Mass percent water ✓ Percent potassium
	2/9	F		-
6	2/12	M	B3: Iodine clock (day 1) Introduction and start Part I	B7 Data Analysis Due: Empirical Formula and Percent Yield B3 Pre-lab and Part I Procedure due ✓ Data for at least one trial
	2/14	W	B3: Iodine clock (day 2) Part I and Part II	B3 Part II Procedure Due ✓ Calculations for Parts I and II
	2/16	F	<b>No classes</b>	-

7	2/19	M	<b>No classes</b>	
	2/21	W	B3: Iodine clock (day 3) Part III and Part IV	B3 Part III Procedure Due ✓ Data analysis for Part III ✓ Print graph (okay to print at home)  Green salt lab report due
	2/23	F	-	-
8	2/26	M	B4: Chemical equilibrium (day 1) Part I	B4 pre-lab due Part I procedure due ✓ Data for Part I
	2/28	W	B4: Chemical equilibrium (day 2) Part II	Part II procedure due ✓ Data for Part II
	3/2	F		-
9	3/5	M	B5: $K_a$ of a weak acid (day 1)	B5 pre-lab due
	3/7	W	B6: $pK_a$ of indicator (day 1) Part I	B6 pre-lab due Part I procedure due ✓ Data for Part I
	3/9	F		
10	3/12	M	B6: $pK_a$ of indicator (day 2) Part II	Part II procedure due ✓ Data for Part II
	3/14	W	B8: Calcium hydroxide (day 1) Data collection	B8 pre-lab due
	3/16	F		-
11	3/19	M	B8: Calcium hydroxide (day 2) Data analysis	B8 analysis due <u>at the end of lab</u>
	3/21	W	<b>Lab Final</b> Check out	
	3/23	F		-
12	3/28	W	<b>Finals Week</b> <b>No Classes</b>	-

## Laboratory Safety

From the American Chemical Society Safety In Academic Laboratories Guidelines, 7th Ed., the following mandatory minimum safety requirements must be followed by all students and be rigorously enforced by all chemistry faculty:

- 1) **Chemistry Department-approved safety goggles purchased from the De Anza College bookstore (NOT safety glasses) must be worn at all times once laboratory work begins, including when obtaining equipment from the stockroom or removing equipment from student drawers**, and may not be removed until all laboratory work has ended and all glassware has been returned to student drawers.
- 2) **Shoes that completely enclose the foot** are to be worn at all times; NO sandals, open-toed, or open-topped shoes, or slippers, even with socks on, are to be worn in the lab.
- 3) Shorts, cut-offs, skirts or pants exposing skin above the ankle, and sleeveless tops may not be worn in the lab: **ankle-length clothing must be worn at all times.**
- 4) Hair reaching the top of the shoulders must be tied back securely.
- 5) Loose clothing must be constrained.
- 6) Wearing "...jewelry such as rings, bracelets, and wristwatches in the laboratory..." should be discouraged to prevent "...chemical seepage in between the jewelry and skin...".
- 7) **Eating, drinking, or applying cosmetics in the laboratory is forbidden at ALL times, including during lab lecture.**
- 8) Use of electronic devices requiring headphones in the laboratory is prohibited at ALL times, including during lab lecture.
- 9) Students are advised to inform their instructor about any pre-existing medical conditions, such as pregnancy, epilepsy, or diabetes, that they have that might affect their performance.
- 10) Students are required to know the locations of the eyewash stations, emergency shower, and all exits.
- 11) Students may not be in the lab without an instructor being present.
- 12) Students not enrolled in the laboratory class may not be in the lab at any time after the first lab period of each quarter.
- 13) Except for soapy or clear rinse water from washing glassware, **NO CHEMICALS MAY BE Poured INTO THE SINKS**; all remaining chemicals from an experiment must be poured into the waste bottle provided.
- 14) Students are required to follow the De Anza College Code of Conduct at all times while in lab: "horseplay", yelling, offensive language, or any behavior that could startle or frighten another student is not allowed during lab.
- 15) Strongly recommended: Wear Nitrile gloves while performing lab work; wear a chemically resistant lab coat or lab apron; wear shoes made of leather or polymeric leather substitute.

***Reckless behavior will not be tolerated. If your actions endanger the health and safety of yourself or someone else you will be asked to leave and you will receive a zero for the day.***

**Student Learning Outcome(s):**

\*Evaluate the principles of molecular kinetics.

\*Apply principles of chemical equilibrium to chemical reactions.

\*Apply the second and third laws of thermodynamics to chemical reactions.