

Chemistry 1A: General Chemistry Section 03 and Section 04 Spring 2018

Instructor: Dr. Megan Brunjes Brophy

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Course Webpage: Canvas

Office Hours: MW 2:20 – 2:50 pm; TTh 3:45 pm – 5:15 pm

Class Meetings

Lecture: TTh 2:30 pm – 3:45 pm, S32

Lab Section 01: MW 11:30 am – 2:20 pm, SC2202

Lab Section 02: TTh 1:30 am – 2:20 pm, SC2202

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.

Official Course Description

Chemistry 1A is the first quarter of a year-long introduction to the principles of general chemistry. Chemistry 1A will address the following topics: An introduction to the structure and reactivity of matter at the molecular level. Application of critical reasoning to modern chemical theory and structured numerical problem solving. Development of molecular structure from rudimentary quantum mechanics, including an introduction to ionic and covalent bonding. Chemical problem solving involving both formula and reaction stoichiometry employing the unit analysis method. An introduction to thermochemistry and a discussion of the first law of thermodynamics.

Prerequisites

CHEM 25 or CHEM 30A or satisfactory score on the Chemistry Placement Test; MATH 114 or equivalent. Advisory: EWRT 1A or EWRT 1AH or ESL 5.

Hours

Three hours lecture and six hours laboratory will be spent in class. In order to succeed in this class, you should expect to spend an additional 8-12 hours per 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*, 8th edition by Silberberg and Amateis. You are encouraged to purchase this textbook from the De Anza College bookstore.
2. A scientific calculator. **Phones and graphing/programmable calculators may not be used on exams.** I recommend the TI-30XS calculator which is available from multiple retailers.
3. The Chemistry 1A laboratory manual is available online at the De Anza Chemistry Department webpage: <https://www.deanza.edu/chemistry/Chem1A.html>. I will post laboratory assignments on the class Canvas page.
4. A dedicated, bound laboratory notebook. Every page of the laboratory notebook must be numbered. Spiral bindings are NOT permitted.
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.
8. Access to a printer. In some cases, you will need to print worksheets or assignments prior to class.

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 mathematical techniques and Chem 25/Chem 30 material that is rusty.
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. You may also email me questions; I will make every effort to answer promptly.
3. Do a little bit every day. Do not leave homework assignments until the last minute. If you are confused on a question, review your notes and the assigned readings. If you are still having trouble, come talk to me immediately during office hours.
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

| | | |
|------------------|----------------|---|
| Add Day: | April 21, 2018 | Last day to <i>add</i> . |
| Drop Day: | April 22, 2018 | Last day to <i>drop</i> the course without a withdraw being recorded. |
| Withdraw: | June 1, 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 on the dedicated check-out day.

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.

| | | |
|----------------|------------|---|
| April 26, 2018 | Exam 1 | Chapters 1–3; Labs A1 – A3 |
| May 17, 2018 | Exam 2 | Chapters 4, 7 and 8; Labs A4 – A5 |
| June 7, 2018 | Exam 3 | Chapters 6, 9, and 10; Lab A8 |
| June 28, 2018 | Final Exam | Chapter 11; Labs A10 and A11; Cumulative material |

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 | 12% |
| Midterm exams | 30% |
| Final | 25% |
| Participation | 3% |
| Lab | 30% of total grade |
| Pre-lab | 5% |
| Lab data and participation | 5% |
| Post-lab worksheets | 5% |
| Formal writing assignments | 5% |
| Lab final | 8% |
| Clean-up | 2% |

| | |
|--------------|----------------------|
| Final % | Grade ^{1,2} |
| >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+ |
| 60.0 – 62.9 | D |
| <60% | F |

¹If 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.

²A+ 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 (3%) may be earned through active engagement during class and attending office hours.** 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. 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 (15%)

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. Homework problems will be posted after lecture on Thursday and due the following **Tuesday by 5 pm**. If you know you have a conflict and will be unable to attend class on a Tuesday that an assignment is due, you may turn it in early. Late homework will not be accepted.

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.

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

A grade of zero will be given if **any** part of the homework has been plagiarized from another source such as the solutions manual or any internet site. Students will forfeit **all** homework points if plagiarism occurs more than once and may be reported to the appropriate deans. You are expected to be able to do all assigned problems prior to the exams. If you have trouble, please come talk to me right away so that you do not fall behind in the class.

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.

If you are in the Tuesday/Thursday lab section, you **must** attend lab the day of the exam. If you skip lab the day of a test, you will receive a zero **on the exam**.

Final (20%)

The final exam will be cumulative. The final exam will be administered on **Thursday, June 28th from 1:45 pm – 3:45 pm**. 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. There are points associated with every scheduled lab day through pre-labs, data, and some analysis worksheets. It is important that you attend lab in order to receive these points. Lab absences may not be excused; however, a portion of points for each of these

three assignment areas will be designated as extra credit. Missing two labs will result in failing 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 10 points. I will check your pre-lab at the start of class. If it is not complete, you will automatically lose 5 of the available points. You may complete your pre-lab after lab lecture for the remaining 5 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 10 points: 5 points for data recorded and 5 points for general conduct and lab citizenship. ***Data collected during the lab period must be recorded in your laboratory notebook in blue or black ink.*** 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. Due dates will be announced in class and on Canvas.

Formal writing assignments (5%)

The formal writing assignments for this class are designed to mimic a formal scientific paper or conference proceeding. All assignments must be completed in a word processor such as Microsoft Word, Google Docs, or Pages. They will be submitted on Canvas as PDF files. The number of points available for each assignment will vary. The precise nature of each assignment will be announced in class and posted on Canvas.

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 one lab period 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.

Copying or paraphrasing homework answers from a solutions manual or other online source is plagiarism as well as a general disservice to your education.

Lecture Schedule, Assigned Readings, and Homework Due Dates

Chemistry 1A will cover material presented in chapters 1–4 and 6–11 of Silberberg. All assigned reading corresponds to the eighth edition of this text. You are encouraged to purchase this book from the De Anza College Bookstore. I particularly recommend purchasing the version that is bundled with Connect if you plan to take 1B and/or 1C in the next year.

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. If we get ahead of schedule, lecture time will be used for extra practice problems. Exam dates will not be modified except in cases of force majeure.

| Week | Date | Day | Lecture Topic <i>Readings</i> | Assignments |
|------|------|-----|--|----------------|
| 1 | 4/10 | Tu | Lecture 1: Tools of the trade •Significant figures, precision, accuracy, and the scientific method <i>Silberberg Appendix A, Chapter 1</i> | |
| | 4/12 | Th | Lecture 2: The nuclear atomic model •Subatomic particles and electrostatic forces, reading the periodic table •Isotopes, ions •Electron energy levels <i>Silberberg 2.1 – 2.6</i> | |
| 2 | 4/17 | Tu | Lecture 3: Molecules, compounds, and mixtures oh my! •Physical changes and chemical changes •The mole, stoichiometry <i>Silberberg 2.7 – 2.9; 3.1 – 3.3</i> | Homework 1 Due |
| | 4/19 | Th | Lecture 4: Chemical reaction stoichiometry •Combustion analysis and limiting reagents <i>Silberberg 3.2 – 3.4</i> | |
| 3 | 4/24 | Tu | Lecture 5: Solutions and solubility •Concentrations: g/L, mg/mL, molarity, molality; dilutions and solubility rules <i>Silberberg 4.1 – 4.2</i> | Homework 2 Due |
| | 4/26 | Th | Exam 1 | |
| 4 | 5/1 | Tu | Lecture 6: An overview of chemical reactions •Precipitation, acid-base, reduction-oxidation Lab A5: Types of reactions <i>Silberberg 4.3 – 4.6</i> | |
| | 5/3 | Th | Lecture 7: The wave nature of light and atomic spectra •Spectral properties of hydrogen •Blackbody radiation and spectra of stars <i>Silberberg 7.1 – 7.2</i> | |
| 5 | 5/8 | Tu | Lecture 8: Wave particle duality and the Schrödinger model of the atom •Quantum numbers <i>Silberberg 7.3 – 7.4</i> | Homework 3 Due |
| | 5/10 | Th | Lecture 9: Many-electron atoms •The Pauli exclusion principle and building the periodic table | |

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| | | | <i>Silberberg 8.1 – 8.2</i> | |
| 6 | 5/15 | Tu | Lecture 10: Periodic trends and chemical reactivity •Effective nuclear charge, atomic size, ionization energy, and electron affinity <i>Silberberg 8.3 – 8.4</i> | Homework 4 Due |
| | 5/17 | Th | Exam 2 | |
| 7 | 5/22 | Tu | Lecture 11: Bond types and bond energies •Metallic bonds, ionic bonds, covalent bonds; relative strengths <i>Silberberg 9.1–9.3, 9.6</i> | |
| | 5/24 | Th | Lecture 12: Hess's Law •Thermochemistry, calculating reaction enthalpy <i>Silberberg Chapter 6</i> | |
| 8 | 5/29 | Tu | Lecture 13: Chemical bonds •Calculating reaction enthalpy from bond strengths <i>Silberberg 9.4 – 9.5</i> | Homework 5 Due |
| | 5/31 | Th | Lecture 14: Lewis Dot Structures Lab A9: Redox titration <i>Silberberg 10.1</i> | |
| 9 | 6/5 | Tu | Lecture 15: VSEPR theory •Molecular shape <i>Silberberg 10.2</i> | Homework 6 Due |
| | 6/7 | Th | Exam 3 | |
| 10 | 6/12 | Tu | Lecture 16: Molecular polarity •Determining molecular polarity from ΔEN and molecular shape <i>Silberberg 10.3</i> Lab: Molecular models | |
| | 6/14 | Th | Lecture 17: Hybrid orbitals •Valence bond theory, linear combinations of atomic orbitals <i>Silberberg 11.1 – 11.2</i> | |
| 11 | 6/19 | Tu | Lecture 18: Molecular orbital (MO) theory •Molecular orbitals, bonding orbitals, and antibonding orbitals Lab A11: Molecular modeling <i>Silberberg 11.3</i> | |
| | 6/21 | Th | Lecture 19: Summary and review | Homework 7 Due (Extra credit) |
| 12 | 6/28 | Th | Final Exam 1:45 pm – 3:45 pm | |

Lab Schedule

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

| Week | Monday | Tuesday | Wednesday | Thursday |
|------|--|--|---|--|
| 1 | Check In | Check In | Measurements <i>*due in class*</i> | Measurements <i>*due in class*</i> |
| 2 | Chemical Nomenclature <i>*due in class*</i> | Chemical Nomenclature <i>*due in class*</i> | Hydrate Day 1 | Hydrate Day 1 |
| 3 | Hydrate Day 2 | Hydrate Day 2 | Precipitation Day 1 | Precipitation Day 1 |
| 4 | Precipitation Day 2 | Precipitation Day 2 | Types of Reactions Day 1 | Types of Reactions Day 1 |
| 5 | Types of Reactions Day 2 <i>*due in class*</i> | Types of Reactions Day 2 <i>*due in class*</i> | Conductivity Day 1 | Conductivity Day 1 |
| 6 | Conductivity Day 2 <i>*due in class*</i> | Conductivity Day 2 <i>*due in class*</i> | Acid-base Titration Day 1 | Acid-base Titration Day 1 |
| 7 | Acid-base Titration Day 2 | Acid-base Titration Day 2 | Calorimetry Day 1 | Calorimetry Day 1 |
| 8 | No class | Calorimetry Day 2 <i>*due in class*</i> | Calorimetry Day 2 <i>*due in class*</i> | Redox Titration Day 1 |
| 9 | Redox Titration Day 1 | Redox Titration Day 2 | Redox Titration Day 2 | Redox Titration Day 3 |
| 10 | Line Spectra <i>*due in class*</i> | Line Spectra <i>*due in class*</i> | Molecular Model <i>*due in class*</i> | Molecular Model <i>*due in class*</i> |
| 11 | Lab Final | Lab Final | Check-Out | Check Out |

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):

- *Identify and explain trends in the periodic table.
- *Construct balanced reaction equations and illustrate principles of stoichiometry.
- *Apply the first law of thermodynamics to chemical reactions.