

CHEM 1B, Spring 2023 Course Syllabus

Reedley College, SCCC

Course Info:

Course #: 51044 – Lecture T/Th 11:00am-12:15pm in MSCI-204; Lab T/Th 8:00-10:50am in MSCI-202

Instructor and Contact Information:

Instructor: Kurtis Thiesen
Office: MSCI 221
Office Hours: Mon/Wed 11-11:50am, Tues/Thurs 12:30-1:20am, Fri 8-8:50am (virtual)
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Prerequisites

To enroll in CHEM 1B, students need to have passed CHEM 1A and MATH 103 or 3A or equivalent with grades of C or better. ENGL 1A is also an advisory for this course.

Required Items

***Textbook:** Chemistry: A Molecular Approach, 6th edition by Nivaldo J. Tro (ISBN: 9780137831968);

***Note:** You are more than welcome to rent or purchase a previous edition (3rd, 4th or 5th edition) of this textbook (hardcopy or etext) anywhere you can find one.

Homework: Homework will be administered using an online program called Mastering Chemistry; the cost of Mastering Chemistry for our course is approximately \$75 and it will be purchased online. Registering for MC (i.e. “how to register”) will be discussed on the first day of class.

Lab Text: The labs (experiments and worksheets) will be available in pdf form on Canvas; you will be required to print these out and bring them to lab with you.

Scientific calculator: Any scientific calculator is acceptable, but graphing/programmable calculators and cell phone calculators are NOT allowed during exams and quizzes.

Safety Goggles & Lab coat: You will not be allowed to participate in lab experiments without your safety goggles and a lab coat. Approved safety goggles and lab coats are available for purchase in the bookstore. Gloves will be provided.

Scantron Form: #882-E, you’ll need one of these for each exam we take in class.

Course Description

This course completes the year-long general chemistry sequence (1A-1B) and covers the principles of physical and inorganic chemistry with an emphasis on quantitative, mathematical problem solving. Topics covered include acid-base theory, chemical kinetics, equilibrium (acid-base, hydrolysis, and solubility), chemical thermodynamics, electrochemistry, selected topics in nuclear chemistry, coordination chemistry, and/or chemistry of selected groups. Students will analyze inorganic compounds qualitatively and quantitatively.

Additional Resources:

Free tutoring is available in the Tutorial Center (Library, Room LRC 111). The link to the RC Tutorial Center is as follows: <http://www.reedleycollege.edu/index.aspx?page=128>

Important Dates:

Friday (1/20) – Last day to drop in order to receive a full refund

Friday (1/27) – Last day to drop in-person in order to avoid a “W”

Friday (3/10) – Last day to drop with a “W” (a letter grade will be assigned after this date)

Additional policies related to adding this course: If a student hopes to add this course, he/she must attend all lecture and lab periods, otherwise he/she will lose their spot on the list of students who are hoping to add the course. Also, if a student is issued an add code, the code must be used within 48 hours; if the code is not used promptly, an alternative add code will be given to the next student on the waiting list, and the original code will cease to be valid (i.e. if the original student adds the course after 48 hours have passed, they will immediately be dropped).

Course Policies:

Lecture Attendance:

- Lecture attendance is mandatory; attendance will be recorded for lecture and lab. You are responsible for the material that you miss if you are absent from lecture or lab.
- Any student who is not present at the start of the first class period may be dropped and their spot given to another student.
- **Important Note: If a student misses more than 25% (combined) of lectures/labs they will be dropped.**

Lab Attendance:

- In order to be counted as present for a lab you must arrive on time, participate in the experiment or activity, and, unless otherwise instructed, stay the entire lab period. In other words, if you arrive late, leave early, or do not participate in lab activities, you may be counted absent and given a zero on your lab exercise.
Note: Showing up late for lab is a safety risk for you and others, as specific safety concerns are generally addressed at the beginning of lab.
- **Important Note: If a student misses more than 3 laboratory sessions they will be dropped from the course (if these absences occur before the final “drop” deadline), or receive a failing grade in the course (if their 4th absence occurs after the final “drop” deadline etc.).**

Canvas:

- Canvas will be used extensively in this course, and students will be expected to check Canvas regularly for updates; lecture PowerPoints and other important documents (for both lecture and lab) will be uploaded to Canvas regularly.

Reading:

- Listed on the course schedule is the associated reading for each chapter. The course expectation is that you will have completed the readings before coming to class on the days those topics are discussed etc.

Missed exams, quizzes and labs:

- Make-up exams and quizzes are generally not given. Since your lowest exam is dropped, if you miss an exam, that score of “0” will count as your dropped score.
- Official RC Policy concerning absences - “There are no institutionally approved excused absences for any reason. Only your instructor may excuse an absence. Absences caused by personal engagements, transportation delays and business affairs will not be excused, nor will absences from class to complete registration or add/drop activities...Makeup work must be completed to the satisfaction of the instructor of the course. Being excused from class does not relieve the student from the responsibility for completing all assignments.”

Cheating:

- Cheating is the act or attempted act of taking an examination or performing an assigned, evaluated task in a fraudulent or deceptive manner, such as having improper access to answers in an attempt to gain an unearned academic advantage. Cheating may include, but is not limited to, copying from another’s work, supplying one’s work to another, giving or receiving copies of examinations without an instructor’s permission, using or displaying notes or devices inappropriate to the conditions of an examination, allowing someone other than the officially enrolled student to represent the student, or failing to disclose research results completely.
- You are encouraged to work together on labs. However, ***your individual work must be evident***. Do not copy work or allow others to copy from your work. Instances of confirmed cheating will generally result in failure and be referred to the Dean for further action.
- Electronic devices such as cell phones, tablets, etc. are not allowed during exams and must be put away in a backpack or purse; confirmed use of these devices constitutes cheating.
- As an alternative to automatic failure in the course, at the instructor’s discretion, you may instead be assigned negative credit for the amount of points possible on the assignment. In this instance, the score would not be allowed to be dropped as your lowest score.
- RC Academic Dishonesty Statement: *“Because cheating, plagiarism, and collusion in dishonest activities erode the integrity of the college, each student is expected to exert an entirely honest effort in all academic endeavors. Academic dishonesty in any form is a very serious offense and will incur serious consequences.”*

Plagiarism:

- Plagiarism is a specific form of cheating: the use of another's words or ideas without identifying them as such or giving credit to the source. One of the most common forms of this is copying information from a website and pasting it into your document. Instances of plagiarism will be treated like any other form of cheating.

Laboratory Safety:

- On the first day of lab we will cover various safety rules. If you do not follow these rules you will be asked to leave, and you may be dropped from the course. For example, if you refuse to wear safety glasses, you would be immediately and permanently removed from the course for your own protection and those around you.

Disabled Students:

- It is our policy not to discriminate against any student. If you suspect that you have any type of physical disability or learning disability that is relevant to your performance in the course, I'll encourage you to come talk to me about it right away (though you're not required to) so that I can support you to the best of my ability. Additionally, it may be helpful for you to stop by the disabled student services office and talk with staff members there to determine what kinds of services and support are available to you to help you succeed in this and other courses. SCCCD policy: *If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact the Disabled Student Services as soon as possible.*

Electronic Devices:

- Use of electronic devices (laptop, tablet, etc.) in the classroom is acceptable as long as it is not a distraction to the instructor or to other students. In lab, they must also be used in such a way as to not cause a safety risk (e.g. do not handle chemicals and then use your computer without removing your gloves and/or washing your hands). Electronic devices of any kind are NEVER permitted during exams.

Classroom Visitors:

- In accordance with Reedley College policy, only students currently enrolled in the course will be allowed in the classroom during lab and lecture.

Grading: Your course grade will be calculated as follows:

| | |
|-------------|-------------------------------------|
| Lab Reports | 15% |
| Lab Quizzes | 10% |
| *Exams | 46% (4 unit exams worth 11.5% each) |
| Final exam | 16% |
| Homework | 13% |

*I will replace your lowest unit exam score with your final exam score if your final exam score exceeds it (see "exams" section for a more detailed explanation).

***Grading Scale:**

| | |
|---|---------|
| A | 90-100% |
| B | 80-89% |
| C | 70-79% |
| D | 60-69% |
| F | 0-59% |

*The instructor reserves the right to alter grade ranges to accommodate borderline grades.

Lab Reports: Expectations about lab reports (including formatting, etc.) and lab worksheets will be discussed during the introduction to lab policy and safety on the first day of lab.

Lab Quizzes: There will be 3 or 4 lab quizzes during the term that are meant to examine whether you've gained a thorough understanding of relevant lab theory, techniques associated with lab experimentation, and, where appropriate, how these lab experiments are related to lecture topics. These will generally be given at the beginning of lab.

Exams: There will be 4 unit exams that are weighted equally and a final exam which is weighted more heavily; these exams may be multiple choice, essay, short answer, or a mixture of these. Make-up exams will NOT be given for unit exams or for the final exam; however, the score on your lowest unit exam may be replaced by your final exam score if your final exam score exceeds it (and if you miss an exam, this will automatically count as your lowest unit exam score). Though each unit exam will be written primarily to examine topics in the current unit/recent chapters, topics in chemistry build upon one another and so all exams should be considered comprehensive.

Homework: Homework will be administered online using Mastering Chemistry. A code for online access to Mastering Chemistry may be purchased online during the registration process (I have posted details about this process on Canvas, and we'll discuss this further on the first day of class).

Student Learning Outcomes for CHEM 1B:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:

- A. Solve and explain chemical kinetics and mechanisms problems
- B. Solve and explain chemical equilibrium questions including but not limited to acid/base and pH concepts
- C. Solve and explain problems on thermodynamic concepts
- D. Solve and explain problems on electrochemical concepts
- E. Explain the fundamental concepts of nuclear chemistry
- F. Demonstrate general chemistry skills in the laboratory including qualitative analysis

Course Objectives for CHEM 1B:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:

- A. use chemical kinetic mathematical operations to determine order and rates of a reaction and understand the effects of temperature;
- B. apply Le Chatelier's Principle to systems displaced from equilibrium, mathematically solve for the equilibrium constant, and describe limitations involving the equilibrium constant
- C. demonstrate the ability to classify acids and bases and then determine equilibrium constant and pH of acids, bases, and buffers;
- D. solve problems involving the common-ion effect in acid-base and solubility equilibria;
- E. evaluate neutralization reactions and titration curves;
- F. recognize fractional precipitations and equilibria involving complex ions;
- G. recognize the concept of qualitative cation analysis and be able to perform related laboratory experiments;
- H. solve simple problems involving chemical thermodynamic problems (work, heat, internal energy, enthalpy, entropy, and free energy);
- I. examine the Second Law of Thermodynamics and apply to the spontaneity of a reaction and the complexity of natural systems;
- J. discuss concepts of an electrochemical cell and mathematically solve for a standard cell potential, change in standard free energy, and equilibrium constants;
- K. recognize physical and chemical properties of element groups (e.g. alkali metals; alkaline earth metals, transition elements, group 13 metals, group 14 metals, nonmetals including halogens, and noble gases);
- L. identify and describe the bonding of complex ions and coordination compounds;
- M. discuss general concepts of nuclear chemistry (e.g. stability, decay, fission, fusion, radioactivity, and nuclear reactions);
- N. perform laboratory procedures and techniques used in semimicro qualitative and quantitative analysis of simple inorganic ions, and the apparatus and measurements used in simple calorimetry and electrochemistry experiments
- O. demonstrate skills in the laboratory in the use of the analytical balance, titration, spectroscopy, pH meter, glassware, melting point apparatus, safety precautions and general laboratory procedures

Tentative Schedule:

| Week | Date | Lecture topics | Text section | Lab experiment |
|------|------------|---|----------------|---|
| 1 | 1/10 | T Syllabus, Intro. to CHEM 1B; Reaction Rates | Ch 15.2 | Intro to Lab Policy/Safety |
| 1 | 1/12 | Th Reaction Rates + Integrated Rate Law | Ch 15.3-15.4 | Locker Check-in, WS0a |
| 2 | 1/17 | T Rate Determinants | Ch 15.5-15.6 | WS 0b |
| 2 | 1/19 | Th Catalysis | Ch 15.7 | Exp 15a |
| 3 | 1/24 | T Equilibrium Reactions | Ch 16.2-16.5 | Exp 15a cont'd |
| 3 | 1/26 | Th $K_c + Q_c$ | Ch 16.6-16.7 | HW (Ch 15) |
| 4 | 1/31 | T Equilibrium Concentration | Ch 16.8 | Exp 16b |
| 4 | 2/2 | Th Equilibrium Disturbances | Ch 16.9 | Exp 16b cont'd |
| 5 | 2/7 | T Catch up/Get Ahead | | HW (Ch 16) |
| 5 | 2/9 | Th Acids and Bases | Ch 17.2-17.3 | Lab Quiz #1 (WS 0a-b, Exp 15a, Exp 16b) |
| 6 | 2/14 | T Acid and Base Strength and pH | Ch 17.4-17.5 | Exam #1 (Chapters 15-16) |
| 6 | 2/16 | Th pH of Acidic/Basic Solutions, Ions as Bases | Ch 17.6-17.8 | HW (Ch 17) |
| 7 | 2/21 | T Polyprotic Acids, pH of Salt Solutions | Ch 17.9-17.11 | Exp 17a |
| 7 | 2/23 | Th Buffers and Buffer Capacity | Ch 18.2-18.3 | Exp 17a Cont'd |
| 8 | 2/28 | T Titrations Revisited, pH Curves | Ch 18.4 | Exp 17a Cont'd |
| 8 | 3/2 | Th Weak Acid/Base Titrations | Ch 18.4 | HW (Ch 18) |
| 9 | 3/7 | T CSU Research Symposium | | CSU Research Symposium |
| 9 | 3/9 | Th Molar Solubility | Ch 18.5-18.6 | Qual. Scheme (intro. + flow chart prep.) |
| 10 | 3/14 | T Coordination Compounds | Ch 26.2-26.3 | HW (Ch 26) + continue qual. scheme prep. |
| 10 | 3/16 | Th Nomenclature and Bonding of Coordination Compounds | Ch 26.4-26.5 | Exam #2 (Chapters 17-18) |
| 11 | 3/21 | T Spontaneity, Entropy | Ch 19.2-19.5 | Qual. Scheme |
| 11 | 3/23 | Th Gibbs Free Energy | Ch 19.6-19.7 | Qual. Scheme |
| 12 | 3/28 | T Free Energy Changes (Nonstandard conditions) | Ch 19.8-19.9 | Qual. Scheme Lab Practical |
| 12 | 3/30 | Th Catch up/Get Ahead | | Lab Quiz #2 (Exp 17a, Qual. Scheme) |
| | 4/4 4/6 | N/A – No Classes Held During Spring Break | N/A | N/A |
| 13 | 4/11 | T Redox Reactions (Review) | Ch 20.2 | HW (Ch 19) |
| 13 | 4/13 | Th Electrochemical Cells | Ch 20.3 | Exam #3 (Chapters 26, 19) |
| 14 | 4/18 | T Standard Electrode Potentials | Ch 20.4-20.5 | Exp 20 |
| 14 | 4/20 | Th Nernst Equation | Ch 20.6-20.7 | Exp 20a cont'd |
| 15 | 4/25 | T Electrolysis, Corrosion | Ch 20.8-20.9 | HW (Ch 20) |
| 15 | 4/27 | Th Radioactivity (types) | Ch 21.3-21.5 | Electroplating lab (object provided or you may bring one) |
| 16 | 5/2 | T Radioactive Decay, Effects of Radiation | Ch 21.6, 21.11 | HW (Ch 21) |
| 16 | 5/4 | Th Catch up if necessary | | Lab Quiz#3 (Exp 20a, Electroplating lab) + clean up/check out of lockers |
| 17 | 5/9 | T Final Exam Review | | Exam #4 (Chapters 20-21) |
| 17 | 5/11 | Th Final Exam Review | | Review cont'd |
| 18 | 5/16 | T Final Exam 11:00am-12:50pm | | |