

General Chemistry, Chm 205 & 206 Sections C and D

with Dr. Bruce Mattson – Spring Semester, 2020

Syllabus & Course Information

Website: mattson.creighton.edu

Chm 205 and 206 are paired lecture and laboratory courses in introductory chemistry. I am your instructor for both. These courses are the second half of a two-semester sequence. We will study Chapters 13 – 21, and parts of Chapters 23 from our textbook this semester.

Fit to Mission. By now you have encountered the Mission Statement of Creighton University (<http://www.creighton.edu/about/mission>). The fifth and sixth paragraphs are especially pertinent to freshmen continuing with the transition to the spiritual and academic life at Creighton:

Creighton exists for students and learning. Members of the Creighton community are challenged to reflect on transcendent values, including their relationship with God, in an atmosphere of freedom of inquiry, belief and religious worship. Service to others, the importance of family life, the inalienable worth of each individual and appreciation of ethnic and cultural diversity are core values of Creighton.

Creighton faculty members conduct research to enhance teaching, to contribute to the betterment of society, and to discover new knowledge. Faculty and staff stimulate critical and creative thinking and provide ethical perspectives for dealing with an increasingly complex world.

Jesuit Charisms. To learn more about how the Jesuits teach us to live the Mission, read the central Jesuit charisms (see <http://www.creighton.edu/cte/preparing-teach/mission-and-identity>): “A charism is a grace or talent granted by God... At a Jesuit university, these charisms help to define how we interact with... each other.” The most common charisms are:

<i>Cura personalis</i>	<i>Care for the whole person: body, mind and spirit Dedication to promoting human dignity Being open to and accepting a person's religious, spiritual and cultural development</i>
<i>Faith that Does Justice</i>	<i>Seeking justice for all God's creatures, especially the poor and marginalized Working actively for and with the poor, and to be just as active in reflecting on God's presence in their work and their relationships</i>
<i>Finding God in All Things</i>	<i>An invitation to spiritually encounter God's beauty in everything we come to know in our lives Accomplished through an ongoing process of personal discernment</i>
<i>Women and Men for and with Others</i>	<i>More than just giving and providing service to those in need, but working with or alongside of those we serve to promote solidarity Recognizing that all humans have physical, emotional, and spiritual needs</i>

Think about how these charisms apply to chemistry, to our class, to your relationship with each other and with me, to the study of chemistry and learning together. Read these again from time to time and use them to interpret your experience in our class together. May they guide and inspire you to be your very best. The Chemistry Department has a Mission Statement that closely reflects these charisms:

Chemistry and You: Our Mission and Promise

The Department of Chemistry strives for excellence in all its programs. We are dedicated to helping our faculty, staff and students discover their talents and abilities and develop them to the fullest, inspiring critical and creative thinking. By providing a broad array of pedagogical approaches including innovative lecture courses and significant laboratory experiences, we are committed to challenging our students to think rigorously and act as ethical scientists and responsible citizens. We seek to offer our faculty opportunities to grow as scholars and teachers, and encourage our students to join us as active participants in our scholarly endeavors, especially independent research. We emphasize the values of trust, respect for others, inclusivity, and personal and professional integrity in the best sense of the Jesuit educational tradition.

Approved by the Chemistry Department 11 April 2019

As a student, you can live the mission and model the charisms as follows:

- First and foremost: Believe in yourself and your ability.
- Help each other learn. Chm 205 and 206 are not graded on a curve, so we are not in a competition for good grades. We are all trying to be successful.
- Treat each other with respect and dignity.
- Attend class every time, be prepared, attentive and fully engaged.
- Reflect on the beauty, the simplicity as well as the complexity of the various chemical concepts, and especially how the concepts work together to help us understand how nature works from a chemistry point of view.
- Ask questions when something is unclear. Others are likely confused on the same point.
- Take thorough and complete notes – write down key discussion points – anticipate answers during discussions – and be ready to explain things to the person next to you.
- Study chemistry (do homework) daily. This is a great chance to form a study group.
- Behave in a professional manner, as expected of a Creighton student

Why should you do these things?

- You will be fully engaged in classroom activities, maximizing learning.
- You may develop a love for chemistry.
- You will develop powerful skills that can be used to interpret the world around us, and to critique and analyze things you hear being promulgated by non-scientists.
- Conducting yourself professionally is a sign of maturity and personal integrity.
- You will have a better chance of earning a good grade in the course.
- You will have a better chance of making a positive impression on me. Over the next few semesters, you may think of me for a possible reference (for student leadership programs, scholarships, pharmacy school application, etc.). You have an opportunity this semester in lecture and lab to make a favorable impression.

Items I consider for Letters of Recommendation: Your Checklist

- Intellectual aptitude
 - Did I earn a grade of B or better in lecture and a B+ or better in lab?
 - Did I perform at the 75th percentile or better on the national standardized final exam?
- Mature, reliable, dependable, professional
 - Were my exam scores consistent?
 - Did I show initiative? Did I finish assigned problems and seek help if needed?
 - Was I motivated and did I exhibit good classroom and laboratory work habits and work ethic (attentive, focused, actively engaged in learning, completed worksheets before next class period)?
 - Did I turn in all work on time, such as lab reports, and on-line data?
 - Was I punctual to class and lab? Was I ready so class could start on time?
 - Was my behavior dignified and professional?
 - Did I show leadership qualities by setting a good example?
 - Was I consistently prepared for class and lab? Did I bring my calculator to lecture and lab? Did I bring my safety glasses to lab? Did I bring my computer to lab every week?
- Integrity (moral principles and core values)
 - Was I honest (truthful, forthright, straightforward, candid, open)?
- Working with others, interpersonal relationships
 - Was I respectful of others (courteous, polite, considerate, kind, and civil)?

Avoid distracting behavior. As a courtesy to your fellow students and to me...

- Arrive on time and avoid coming and going during class.
- Do not sleep, whisper, daydream, study other subjects, etc.
- Put away your cell phone and your laptop and participate in learning wired-free during class time.

Part 1 Chm 205

- 1. Chm 205.** This course is designed for students with a good background in chemistry and math, especially algebra, setting up and solving word problems, use of scientific notation, and logarithms. For most students, Chm 205 consists of topics that contain a significant amount of new material over the high school treatment of the topic. The Chm 206 specific syllabus follows on page 7.

This syllabus contains course information that will be of use throughout the semester. The syllabus is our agreement as we work our way through the course. All policy questions are answered herein. Deviating from the agreement will not occur in fairness to the class as a whole.

As your chemistry professor, I wish you success in the course. I am here to help you! My best advice is to stay on schedule! Catching up is difficult and never as effective as staying on top from the start. The "A" and "B" students do their homework every day, typically working on chemistry about two hours for every one hour lecture. By doing so, they learn and retain the concepts. Cramming simply does not work in a science skills application course and almost always leads to unfortunate results on the comprehensive final exam.

- 2. Textbook and Calculator.** Required for the course:

Text: **Chemistry**, by McMurry, Fay, and Robinson, 8th Edition.

Simple scientific calculator (non-programmable)

- 3. Course website.** This course is supported by a website. The site includes all of the course information, copies of handouts, previous years' exams, etc. Link to it from the website mattson.creighton.edu. Click on Chm 205 or Chm 206.
- 4. Course Communication.** I will notify you by e-mail of any changes to the schedule or of any pertinent details that may come up. Check your Creighton e-mail regularly and keep your mailbox operational.
- 5. Office, e-Mail.** My office is Hixson 262; e-Mail: brucemattson@creighton.edu. Stopping by my office is always the best idea for getting help. Contacting me by e-mail also works well.
- 6. Office Hours.** Office hours are those hours during which I am in my office (HL-262) and available for answering questions and discussing and studying chemistry. On my office door, I post a weekly schedule. I have many office hours throughout the week. Check my door to see if I am available. When my door is open, you are welcome to come in! If you prefer an appointment, sign up on my door for a time.
- 7. Attendance Policy.** I require attendance. I feel that I have information that will be useful and interesting I know that attending my lectures will help you on the exams.
- 8. Learning Objectives and assigned homework problems.** Learning objectives are provided at the end of each chapter. For example, in Chapter 12, these are on pages 481 and 482. Assigned problems are provided on each daily worksheet. Working problems is the single most important way to prepare for tests. Use my office hours to ask questions about these problems. You should work problems on a daily basis. Perhaps form a Study Group! Assigned problems often appear on exams. Bring your homework to class.
- 9. Daily worksheets.** On most days I will distribute a worksheet with problems that you should be able to do after the day's lecture. Complete the worksheet prior to the next class meeting.
- 10. Course Content.** A day-by-day (calendar) list of activities is included with this information. Changes and adjustments to the content are possible.
- 11. Unit Exams.** The four unit exams cover 7 – 9 lectures each. The exams are based on the lecture material, assigned material from the text and the homework problems. You will be allowed to use a non-programmable calculator on the exams. Each of the exams is worth 100 points. Exams will be returned as soon as possible after the exam date, usually by the next class meeting. If you are not present when the exams are returned, you may pick your exam up during my office hours.

Re-grading policy. A grade appeal for an exam must be made to me within three school days of the date on which the exam is returned to the class. I make electronic scans of your exams and re-grading is done from the scans. After three school days the grade book is closed and re-grading for additional points will no longer be possible.

- 12. Grade reports.** After each exam, starting with the second exam, I will send out a grade summary report by e-mail.
- 13. Missed exams.** Due to the on-line nature of the second half of the course, this section will be modified for Exams 3 and 4. Taking the exam at the assigned time is expected. If you cannot take the exam at the assigned time, you should have a pre-approved excuse with appropriate paper documentation. Other excuses, regardless of how compelling, constitute being absent from exam. Avoid missing exams! There are two types of missed exams: **Excused** and **Absent from Exam**.
- **Excused exams** include documented reasons for being absent, such as being out of town for CU sports participation, attending an important family function such as a wedding or a funeral, a court appearance, a sanctioned campus function and the like. You must provide me with approved documentation (such as a copy of the wedding invitation) in order for it to be considered an excused absence. Being ill with an authenticated medical excuse that requires hospitalization or departure from campus for purposes of recovery is considered an excused absence – the easiest way to authenticate your medical excuse is to have your college dean's office send an e-mail to all of your professors stating that you have a medical excuse for not attending any classes or labs. (Notes from Student Health or a doctor's office for an illness contracted shortly before the test does not count as an excused absence.) I reserve the right to not accept a particular excuse. Missed exams with excused absences can be made-up as soon as possible after the actual exam, but not after the exams are returned in class – this means that the exam must be completed by 8:00 AM on the next day that the class meets. Excused absence exams that are not completed before the exams are returned in class are reclassified as **Absent from Exam**.
 - **Absent from exam = Make-up Exam.** Failure to take the exam with your classmates, except for an excused absence, constitutes being Absent from Exam. This includes becoming sick the day or night before the exam, accidentally sleeping through the exam, feeling unprepared to take the exam, or failing to complete an excused absence exam on time. Students who are classified as Absent from Exam will be given a make-up exam. The format of the make-up exam is different from the missed exam. Make-up exams must be completed within ten school days of the original exam (except for Exam 5, which must be completed before 4 pm Friday, May 3, 2019), after which the score will be entered as zero. Students with excuses from their dean's office for prolonged absences will have ten days starting with their first day back in classes. Students are allowed only one make-up exam per semester. Additional absences will receive a grade of zero. Make-up exams are not returned but may be reviewed in my office.
- 14. Problem Club with Kendall.** Our class has an attached tutor assigned to it, Ms. Kendall Cameranesi. She takes notes and conducts two evening tutorials per week (7:30 – 9:00 PM Sundays and Thursdays. Before Exams 2 and 5, which are on Wednesdays, the review will be on Tuesdays, October 22 and December 3 instead of the Thursday after the exam.). The EDGE also provides chemistry tutors on a walk-in basis. EDGE tutors are available Sunday — Thursday evenings from 6 – 9 PM.
- 15. Tutorial Help.** Chemistry majors have been hired to serve as tutors. The tutor schedule will be posted on the course website as soon as it is available. Tutors are available Sunday — Thursday evenings from 6 – 9 PM. I recommend that you use my office hours as your first choice, however. We will also have a dedicated personal course tutor who will attend lectures and conduct reviews. Details will be announced in class. Our dedicated classroom tutor is Ali Cunningham. Her reviews will be on Sunday and Tuesday evenings from 7 – 8:30. Room TBA.
- 16. Course Grade.** You will receive periodic grade reports via e-mail. The course is worth 500 points in total. Please note that your grade in this course is wholly determined by your exam grades. There is no other way to earn points, so be prepared for each exam by attending class, doing your homework, and making sure you understand all concepts. Course points are distributed as follows:
- | | |
|--------------|-------------------|
| Exams 1 – 4: | 100 points each |
| Total | 400 points |
- The grade you will be assigned can be determined as follows. Note: These are absolute cut-offs.
- | | | |
|-----------------------------|---------------------------|------------------------------|
| A (4.00) ≥ 93.00% | A- (3.67) ≥ 89.00% | |
| B+ (3.33) ≥ 85.00% | B (3.00) ≥ 81.00% | B- (2.67) > 77.00% |
| C+ (2.33) ≥ 73.00% | C (2.00) ≥ 69.00% | C- (1.67) ≥ 66.00% |
| D (1.00) > 60.00% | | |
- 17. Cell phones, e-tablets and laptops.** Use of cell phones (calling, texting) during class is not allowed. Cell phones must be left in backpacks, purse, etc.

- 18. What if Creighton is closed?** If the University is closed for the day due to weather, we will not meet. Sometimes the University has a late start, which allows the grounds crew to clear the parking lots. If the University opens at 10 AM, Section C will start at 10 AM, rather than 9:30 AM. If the University opens at 10:30 or later, both lectures are cancelled. [Note: This item is different for Chm 206 – see below.](#)
- 19. Dropping the course?** If you have a D or F grade at midterm, you may wonder about dropping the course. The last day to drop the course with a W is Friday, April 3rd. Use the instructions given in #23 below in order to calculate what you need to achieve on all subsequent exams in order to improve your grade. Note: Incomplete grades are not intended for students who need to make up a large portion of the course or retake the entire course. Conditions for an “I” are: A student may be given a grade of “I” if circumstances beyond his/her control prevent him/her from completing the required work during the normal term. It is assumed that the student is otherwise passing the course.
- 20. Academic Integrity.** The University has an established policy on academic dishonesty. The University defines the term to include “representing the work of others to be one's own (cheating on an exam), tampering with the experiments of others, defacing or tampering with library or student materials or facilitating dishonesty on an exam.” The latter point is understood to include situations where you notice cheating occurring but do not report it immediately. In General Chemistry, the most blatant forms of academic dishonesty include: (a) copying the work of others on exams, (b) sharing information with others about exams (both during the exam or between class periods, (c) using notes when notes are not allowed (in calculator slip covers, palms of hands, baseball caps, slips of paper tucked away, and so on), (d) making changes on graded materials that have been returned to you, (e) working together on take-home exam problems when that is expressly forbidden, (f) cell phone photographing or texting exam information or answers, (g) sharing calculators during the exam (with someone who forgot theirs), and so on.

As a member of the Creighton community, promise yourself and Creighton to join others:

- ❖ committing ourselves to the pursuit of knowledge throughout our lives and to developing the skills that we have been given.
- ❖ acknowledging our obligation to respect all women and men and to use wisely the resources of the world around us.
- ❖ solemnly promising to uphold the highest moral and ethical standards and thus to bring credit to the College by our life and our work.

Any act of academic dishonesty tarnishes and diminishes the worth of each of these promises. Remember your promises. Keep your promises. Live up to your promises. Extend these promises into lifelong promises to yourself and others. You will not be disappointed.

In the event that you are accused of engaging in academic dishonesty, you will receive a “0” for the exam. The incident will be reported in writing in accordance with the protocol set forth by the College of Arts and Sciences. For details, see the website www.creighton.edu/ccas/ then follow links: Current Students > Student Resources > Policies and Procedures > Code of Conduct. Students accused of academic dishonesty have the right to an appeal.

The following pledge appears on each exam, and I will remind you to read and sign it each time.

Academic Integrity Pledge

In keeping with Creighton University's ideals and with the Academic Integrity Code adopted by the College of Arts and Sciences, I pledge that this work is my own and that I have neither given nor received inappropriate assistance in preparing it.

- 21. Appealing the final grade.** After I have determined your final grade, I do consider cases that are within 0.7% of the next cut-off (3.5 points). IF you are that close to the next better grade AND your score on the final exam is at least as good as the grade you desire, you will get the better grade. No other cases will be considered in fairness to the class as a whole.
- 22. Emergency University Closure.** In the event of a disruption of normal classroom activities due to emergencies such as a disease outbreak the format for this course may be modified to enable completion of the course. In that event, you will be provided an addendum to this syllabus that will supersede this version.

23. Chm 205 Learning Objectives in common with all sections/instructors. Students will be able to:

1. calculate concentrations of solutes in solutions utilizing appropriate concentration units, including those used for quantifying colligative properties.
2. explain the kinetic theory of matter and the energetics of reaction mechanisms, and calculate the rate of a reaction while considering its dependence on reactant concentration, time, and temperature.
3. understand and apply the concept of equilibrium, calculate equilibrium concentrations, predict the direction in which a reaction will move to reach equilibrium, and predict how changes to a system at equilibrium will alter the reaction mixture.
4. identify acids and bases, predict their relative strengths, calculate the pH of an acidic or basic solution, and apply the concept of equilibrium to calculate concentrations in acid/base systems.
5. apply the concept of equilibrium to titrations, buffer solutions, properties of salt solutions and solubility, and identify and calculate concentrations in acid/base systems.
6. apply the laws of thermodynamics to chemical systems, calculate the changes in enthalpy, entropy and free energy for chemical reactions, and predict the spontaneity of a chemical reaction.
7. balance oxidation-reduction reactions for mass and charge, use the balanced reactions to determine cell potentials, and evaluate the spontaneity of electrochemical reactions.
8. conceptually and mathematically express the relationship between equilibrium, free energy, and electrochemical cell potential.

24. How can I improve my grade? How can I keep my current grade?

Here is how to figure this out: Add up your scores to see how many points you currently have. Subtract that from the total points needed for the desired grade. Then divide this number by the number of remaining graded exams/labs. The same calculation is used to compute what you need to keep your current grade. Example. In lecture a student earned scores of 92, 91 and 94 on the first three exams, totaling 277 points. In order to get an A for a final grade, the student needs 93% of the course total of 400, or 372 points, which is 95 more than the student currently has. With one exam to go, the student needs 95 on the last exam. Example 2. After two exams a student has scores of 78 and 83 for a grade of B-. To earn a final grade of B, the student needs an overall 81% and for a B+ an overall 85%. With 400 points total, the B requires 324 points and the B+ requires 340 points. For the B, the student needs $324 - (78 + 83) = 163$ points on the next two exams, or an average of 81.5 on each. For the B+, the student needs to average 89.5 points. To keep the B-, the student needs 77% of 400, or 308 points all together. This leaves $308 - (78 + 83) = 147$ points to go – or an average of 73.5 points the remaining exams.

Part 2 Chm 206

CHM 206 Course Syllabus (Dr. Mattson) General Chemistry Laboratory Spring Semester 2018

Section CC Thursdays at 8:00 AM and DD Thursdays at 11:00 AM

Instructor: Dr. Bruce Mattson Office: HLS 262; email: brucemattson@creighton.edu

Teaching Assistants:

Section CC:

Christy Heimbrecht
Bethany Castro
Shelley Helmeke

Section DD:

Lydia Johnson
Spencer McKinley
Denise Torres

Website for Chm 206 with Dr. Mattson (you can link to it from my home page, mattson.creighton.edu)

Introduction: The experiments in this course have been designed to complement the topics covered in CHM 205, General Chemistry II Lecture. This course consists of a laboratory period that will begin with a discussion of the experiment to be done. As a student in this course, you must come to lab sufficiently prepared. All experimental work will be done during the lab period.

Lab specific Objectives: You will...

- understand the chemical principles that pertain to each experiment.
- participate in laboratory experiences designed to cover concepts related to Chm 205.
- maintain responsible work habits in the laboratory.
- report your findings honestly and will not take credit for work done by others.
- know how to experimentally determine various quantities including mass, volume, concentration, density, quantity of heat, and molar mass.
- learn how to prepare inorganic substances from carefully conducted chemical reactions.
- properly use the following equipment and glassware: analytical balances, burettes, volumetric pipettes, Mohr pipettes, and graduated cylinders.
- be able to understand an experimental procedure, perform it, and obtain accurate results.
- handle chemicals in a safe manner.
- maintain a laboratory notebook, recording experimental procedures, data, and observations for each experiment in such detail that the experiment could be repeated by another individual using only your laboratory notebook. You should record all data and observations in a complete and organized manner.
- analyze experimental data and draw appropriate conclusions from the data.
- prepare graphs using Microsoft Excel and interpret the data from them.
- identify sources of error in an experiment and explain how they affect the results.

Required Materials: (Items 1 – 3 available from the Chemistry Stockroom)

- 1) General Chemistry II Laboratory Manual, Spring 2019.
- 2) Laboratory Notebook (You can continue to use your notebook from fall semester.)
- 3) Safety goggles or approved safety glasses. I will provide a storage drawer if you wish to store them in lab.
- 4) Scientific calculator
- 5) A personal laptop computer.

Safety. You must follow the safety regulations at all times in the laboratory. Safety regulations are in place to protect you and those around you. You must know and observe all of the safety rules listed in the laboratory manual. If you have safety glasses that were not purchased from the Chemistry Department Stockroom, you must check with me to ensure that they meet Creighton and OSHA safety standards.

Chemical Waste Disposal. All chemical wastes will be disposed of in the proper waste containers. Do NOT put any chemicals in the sinks or wastebaskets unless specifically instructed to do so.

Breakage. You are responsible for equipment broken or damaged. If you owe more than \$10, you must pay the Stockroom before receiving the replacement.

Cleaning Up. Before leaving the lab each day, you must make sure that the bench-top, balances, and the area around the balances are clean.

Grading: Due to the on-line nature of the second half of the course, this section will not apply. There are 625 points possible in Chm 206 – twelve experiments at 50 points each and the 25 point Orientation Activity on January 16th. Each experiment consists of a 10-point quiz score + 40 point lab report score (including on-line results). Chm 206 grade cut-offs are the same as Chm 205 cut-offs. Specifically to the lab: 1. I do not drop the low score. 2. Your quiz grade must reflect your overall grade. This is achieved with the following grade caps: If the average score on your best n-1 quiz scores* is ____ out of 10, your maximum course grade is ____.

Average Quiz Score*	Maximum Course Grade
8.50	A
8.00	A-
7.50	B+
7.00	B
6.50	B-
6.00	C+
<6.00	C

*For this calculation only, I drop your low quiz score; I do not drop your low score for computing your initial course grade.

How does this work? Suppose you earned a 585 points (quiz + experiment) over 12 experiments + Orientation Activity which is 93.6% for an A, but your average quiz score for your 11 best quiz scores is 8.4 out of 10, which is less than the 8.5 minimum required for an A, so you would get an A- for your final lab grade. Your average quiz score does not assure a course grade: If your experiment score (quiz + lab report) average is 90% (A-) and your quiz average was 8.6, you would get the A-. However, if your quiz average were 7.2, you would get a B. The point is, take your quizzes seriously.

Missing partner? Notify me (Dr. Mattson) if your partner is absent. I will pair you with another unpaired individual or make other arrangements. Do not join another group on your own.

Can't attend lab? Notify me (Dr. Mattson) ahead of time (not after the lab is over). With a valid excuse, you can attend another section of lab. There are no labs on Friday. In cases where the lab cannot be made up, there will be a make-up lab at the end of the semester. Only one lab can be made-up; subsequent absences are graded as zero.

TAs: We will have three teaching assistants, TAs, to aid with safety and to help answer questions and provide tips in the lab. Each TA will work closely with four of the stations in the lab on a rotating basis.

University Closure. If the university is closed, one of two possibilities will occur: Possibility 1. Dr. Mattson will provide you with the data you would have obtained in lab and you will be able to complete the lab with the provided data. If this option is employed, the lab report will be due the following Friday at the start of class. Possibility 2. The lab is cancelled and the course point total will be reduced by 50 pts. Possibility 1 will be the more normal response. You will be notified by e-mail of which response will be taken. (Some experiments are more critical than others and those are the most likely to be fulfilled by Possibility 1.) If the University has a 10:00 or 10:30 AM late start, Section DD will have a normal lab.

Dropping Lecture but keeping lab? To stay in lab but drop the lecture, ALL of the following criteria must be met: 1. You must not withdraw from lecture until the second Monday after midterm, 2. You must have a C- or better in lab, and 3. I must sign your withdrawal form.

Format for each experiment. Due to the on-line nature of the second half of the course, not all parts of this section apply.

Prior to lab: Pre-lab Presentations: Each week it is your responsibility to study the pre-lab presentation (*Chem Lab with Stick People and Bird*) available from the Chm 204 website. These presentations function as your introduction to the upcoming experiment and are useful in writing your introductions, which are due before lab begins.

Prior to lab: Introduction: You are required to write an introduction to the experiment prior to coming to lab. This is explained in detail in the pre-lab presentation to Experiment 1. We will check your introductions while you are taking the quiz.

Laboratory Quizzes. Each experiment includes a weekly quiz worth 10 points. Lab starts promptly at 8:00 AM or 11:00 AM with the quiz and typically takes no more than 15 minutes. There are no make-up quizzes. If you arrive a few minutes late, you will have less time for the quiz, but you can earn some points. You cannot work past the end of the quiz at a quarter after the hour. If you arrive after the quiz is over, your quiz score is zero.

Laboratory reports. Each experiment is always worth 40 points and the weekly quiz is worth 10 points for a total of 50 pts. A template cover sheet for the experiment to be performed is provided in the first week

presentation in lab. Cover sheets will be passed out at the start of lab each week. A few comments on each part:

Part 1. General appearance, purpose, and quality of introduction. Introductions are written prior to coming to lab and are based on (a) the pre-lab presentation and (b) the material provided in the lab manual. This section is worth 5 points.

Part 2. Experimental Details, Observations, Calculations and Results. This section is worth 10 – 20 points. A number of experiment-specific items are called for here. Treat this section like a checklist for completion of the experimental requirements. Read carefully! Sometimes you are instructed to attach a graph, sometimes you submit data to your TA electronically, and sometimes nothing additional is called for. Watch your units and significant figures!

Part 3. Conclusions (3 pts) Thoughtfully address what you learned by doing the experiment. What did you find out? Conclusions are read carefully, so think about these few sentences carefully.

Part 4. Sources of error (typically 3 pts). If you feel like something went wrong, especially if your results seem inaccurate, you should address that issue here. If everything went well, it is appropriate to state, "No errors noticed." Note: In many cases where an error is known to have occurred (e.g. you spilled a reagent), you can simply repeat part or all of the experiment if time allows.

Part 5. On-line results. (0 – 25 pts) Most experiments have a component in which you and your lab partner together submit one set of data for the pair of you. The results are analyzed carefully for proper use of units and significant figures, and your calculations are checked. The link to the on-line data form is given at the lab website (see above). The data are collected in a Google Form which is time-stamped. You will receive a 5-digit confirmation number that you should record on your coversheet. Submit your data with your lab partner before you leave lab. Data submitted after the deadline may not be graded, but 40% credit will be awarded if the results are submitted by 11:59 PM on the day of the lab.

Penalty points

1. Introduction not written prior to lab or unacceptably short: 5 pts
We will inspect your notebook during the quiz period. If the introduction is not written or is unacceptably short, you will get <5 points. You will still need to include an introduction to prevent further point loss.
2. Lab report late
Lab reports are usually due either (a) immediately following lab, or (b) at the start of class on Wednesday following the lab experiment (no later than 9:30 AM for Section CC, and no later than 11:00 AM for Section DD). You may always hand them in immediately following lab. Lab reports handed in late but prior to 1 pm on the Wednesday immediately following lab are penalized 3 points. If the lab report is handed in later than 1:00 PM on the Wednesday, it will receive a score of 40% of the point value of the **report portion**, but will not be graded. If it is handed more than 6 days late, the **report portion** counts for no credit. Note: your quiz score and on-line score will always be counted for full credit. Lab reports misfiled into the wrong folder are penalized 3 points. Lab reports with missing header information on the cover sheet are penalized 1 point for each missing piece of information (name, section, station, lab partner,
3. Safety violations 5 – 50 pts
Any activity deemed to be unsafe will result in a safety penalty of no less than 5 points. Not wearing safety goggles will result in a 5 point penalty for each occurrence.
4. Misuse of laboratory time (e.g., using cell phone, texting, unprofessional behavior, etc.) 5 – 10 pts
One of the course objectives is: "You will maintain a responsible work habit in the laboratory." Excessive visiting, fooling around, general misbehavior, misuse of cell phones (texting, talking) and similar activities is not allowed in the lab. Under most circumstances, students will receive one warning.
5. Failure to clean up equipment, glassware and work area 5 pts
Glassware must be left clean and well-organized for the next group of students. All of the equipment must be present. If you find the equipment dirty when you arrive, please notify Dr. Mattson and he will report the situation to the laboratory instructor of the previous section.

Course communication: All official course communication and announcements will take place via e-mail to your Creighton University e-mail account, and announced in class, if possible. It is your responsibility to check your Creighton e-mail regularly and to ensure that your inbox is empty enough to accept incoming e-mails.

Academic Dishonesty: In addition to the academic integrity statement given above for Chm 203, some additional lab-specific comments are: Cheating in any form will NOT be tolerated. This includes, but is not limited to, copying old or new lab reports, copying another student's lab reports, and/or falsifying data. You and your lab partner are welcome to discuss your answers and calculations with other students in the lab, with your TAs, and with me. The lab report, however, must be written in your own words and based upon your own work.

Chm 206 Learning Objectives in common with all sections/instructors. Students will be able to:

1. collect and interpret data collected electronically.

- analyze data graphically and perform calculations in a spreadsheet program.
- use the gas laws and experimental measurements to determine the molar mass of a gas.
- create a Beer's Law plot and use the molar absorptivity to calculate concentrations from absorbance measurements.
- determine reaction kinetics from experimentally collected data.
- convert between $[H_3O^+]/pH$ and K_a/pK_a .
- determine an equilibrium constant experimentally.
- perform acid-base titrations.
- collect a titration curve for a polyprotic acid and then identify the species present and the pH of the equivalence and half-equivalence points.
- choose a salt and prepare a buffer solution of a target pH.
- calculate thermodynamic quantities from experimentally collected data.
- experimentally measure cell potentials and relative reduction potentials.

January/February 2020

Monday	Tuesday	Wednesday	Thursday	Friday
		15 Ch. 13. Solutions Sections 13.1 – 13.4	16 Orientation Activity (in lab), 25 points. Also, bring \$15 to buy lab manual. Pick lab station and lab partner.	17 Snow Day CU cancelled.
20 Ch. 13. Solutions Sections 13.5 – 13.7	21	22 Ch. 13. Solutions Sections 13.8	23 Expt 1. Colligative Properties (Quiz covers Syllabus and Expt 1 pre-lab presentations)	24 Ch. 13. Solutions Sections 13.9 Chapter 14. Kinetics Sections 14.1 – 14.3
27 Ch. 14. Kinetics Sections 14.4 – 14.6	28	29 Ch. 14. Kinetics Sections 14.7 – 14.8	30 Expt 2. Beers law	31 Ch. 14. Kinetics Sect 14.9 – 14.13

February/March 2020

Monday	Tuesday	Wednesday	Thursday	Friday
3 Catch-up and Review	4	5 Exam 1 Chapters 13 and 14	6 Expt 3. Kinetics	7 Ch. 15 Equilibrium Sections 15.1 – 15.4
10 Ch. 15 Equilibrium Sections 15.5 – 15.7	11	12 Chapter 15 Equilibrium Sect. 15.8 – 15.10	13 Expt 4. Equilibrium	14 Finish Chapter 15 Equilibrium
17 Chap. 16. Acids and Bases Sections 16.1 – 16.7	18	19 Chap. 16. Acids and Bases Sect. 16.8 – 16.10	20 Expt 5. K_{sp}	21 Chap. 16. Acids and Bases Sect 16.11 – 16.13
24 Chap. 16. Acids and Bases Sect 16.14 – 16.15	25	26 Finish Chap. 16. Acids and Bases	27 Expt 6. K_a and pK_a of Acetic Acid	28 Catch up and Review

March 2020

Monday	Tuesday	Wednesday	Thursday	Friday
2 Catch up and Review	3	4 Exam 2 Chapters 15 and 16	5 Expt 7. Titration of a polyprotic acid	6 Chapter 17 Aqueous Equilibria Sections 17.1 – 17.4
B	R	E	A	K
16 Pause Week to switch to On-line	17	18	19	20
23 Chapter 17 Aqueous Equilibria Sections 17.5 – 17.7	24	25 Ch. 17 Aq Equilib Sect 17.10 – 17.11	26 Expt 8. Prep of a Buffer I DRY LAB	27 Ch. 17 Aq Equilib Sect. 17.8 – 17.9

April/May 2020

Monday	Tuesday	Wednesday	Thursday	Friday
30 Ch. 17 Aq Equilib Sect 17.12 – 17.14	31	1 Ch. 18 Thermo Sections 1, 2, 4, 5	2 Expt 10. K, ΔG , Urea Lab DRY LAB	3 Last day to drop
6 Ch. 18 Thermo Sections 7, 8, 9	7	8 Ch. 18 Thermo Sect 17.10 – 17.11	9 Easter	10 Easter
13 Easter	14	15 Exam 3 Chapters 17 and 18	16 No lab this week	17 Ch. 19 Electroch Sections 19.1 – 19.5
20 Ch. 19 Electrochm Sections 19.6 – 19.9	21	22 Ch. 19 Electrochm Sect 19.12 – 19.14	23 Expt 11. Redox DRY LAB	24 Ch. 20 Nuclear Sections 20.1 – 19.3
27 Ch. 20 Nuclear Sections 20.4 – 19.6	28	29 Ch. 20 Nuclear Sections 20.7 – 20.9	30 Expt 12. Nuclear DRY LAB	May 1 Review
4	May 5 Exam 4 Chap 19, 20, and 21			