

Chemistry 163 – Section B
Course Information and Syllabus: Spring 2014

Instructor: Ken Marr Phone: (253) 833-9111 x 4204 Office: SC-214 E-mail: kmarr@greenriver.edu Chemistry 163 Web Page: http://www.instruction.greenriver.edu/kmarr	Office Hours Mondays 9:00 – 10:50 a.m. in SC-240 or SC-214 Wednesdays 9:30 – 10:50 a.m. in SC-240 or SC-214 Fridays 9:30 – 10:50 a.m. in SC-214 And by appointment!
Class Meeting Times: “Lecture” in SC-323: MWF: 11:00 – 11:50 a.m.; Tuesday: 10:00 – 11:50 a.m. Lab in SC-308: Thursday: 10:00 – 11:50 a.m.	

The Course

Chemistry 163 is the continuation of Chemistry 162. Topics covered include: Chemical kinetics, chemical equilibrium (including acid-base and solubility equilibria), thermodynamic and electrochemistry (i.e. Chapters 14-21 in *Chemistry by Silberberg, 6th edition*). Much of the material will draw on concepts learned in Chemistry 161 and 162. If you received less than a 2.0 in Chem 161 or 162, you can expect to have difficulty in Chem 163. Allow enough time in your schedule to put in the extra study time that will be needed. The course satisfies lab science distribution requirements for the AA and AS degree.

Mode of Instruction: Active Learning with little to no lecture

Welcome! You are about to embark on a journey that may change your view of chemistry and will surely change your view of science and learning. In this course through active learning exercises and collaborative group work and a minimum of lecturing you will generate knowledge about chemistry. Your instructor will serve as a facilitator, and a resource for information. This method of learning will allow you to practice thinking, speaking, and writing as you formulate answers to daily Active Learning Exercises (“ALE’s”) that use the “POGIL” approach (more info at www.pogil.org). You will be actively involved *everyday* in a variety of activities so class is interesting (we hope!) and you won’t want to miss. You will probably learn much more chemistry in this course than in others where an instructor only lectures to you.

Why the use of active and collaborative learning in place of lectures? A wealth of research over the last 20 years indicates that little learning occurs during passive learning (i.e. lectures) and that lectures, at best, only indicate what students should study *outside* of class. Moreover, controlled studies show that students involved in collaboratively taught classes out-perform those in the same course where lecturing is the major means of instruction.

You may find that collaborative/active learning requires an extensive effort from you. In addition, a few initially feel uncomfortable with this new style of instruction/learning. This is not unusual, in part because the majority of our past classes were taught in the traditional way...Recall the old adage, “It’s hard to teach an old dog new tricks”? Collaborative/active learning will *force* you to do the required readings/exercises *every day*, and in the process will allow you to develop more effective study strategies/habits, to use your study time outside of class more effectively. In time you will become more familiar and comfortable with your classmates and feel more at ease during group/class discussions. *The skills that you learn and practice through active learning and collaborative group work in this class will stay with you and serve as a firm foundation for success in other classes and when you study at the university level.*

Course Prerequisites

- Successful completion of Chem 161 and 162 with a minimum grade of 2.0 and eligible for Math 151 (calculus) or higher or instructor's permission.
- Availability of at least 2 hours of *quality* study time outside of class for every hour in class: i.e. at least 14 hours per week hours. **WARNING!** It is unlikely that you will do well in this class if you do not invest this amount of time!
- An interest in learning about the natural world and a positive attitude is a great asset!

Course Materials The required text and materials are: (available in the campus bookstore)

1. *Chemistry: The Molecular Nature of Matter and Change, 6th edition*. This book has a website with quizzes and many other excellent study resources: http://highered.mcgraw-hill.com/sites/0072396814/student_view0/ and http://highered.mcgraw-hill.com/sites/0073402656/student_view0/
2. *Student Lab Notebook with Spiral Binding: 100 Carbonless Duplicate Sets*. Hayden-McNeil publishers (Use the one from Chem 162 or purchase new at the GRCC bookstore!!)
3. *Lab Exercises and Active Learning Exercises* ([Print from class website](#))
4. Scientific Calculator (bring to class daily). **Note:** Use of programmable calculators will not be allowed on exams.
5. Laboratory Safety Goggles (Available at GRCC bookstore)
6. Useful items: 6 inch ruler, small stapler, 3-ring binder with dividers for ALE's and Labs

Special Needs

If you believe you qualify for course adaptations or special accommodations under the Americans with Disabilities Act, it is your responsibility to contact the Disabled Students Services Coordinator, (253) 833-9111, ext. 2631, and provide the appropriate documentation. If you have already documented a disability or other condition, which would qualify you for special accommodations, or if you have emergency medical information or special needs I should know about, please notify me during the first week of class. You can reach me by phone at (253) 833-9111, ext. 4204, or you can schedule an office appointment to meet me in SC-214 during my posted office hours, or at another mutually determined time.

Learning Outcomes

Content-specific:

Specific Learning Outcomes for this class include the ability to:

1. Describe the structural characteristics, and draw representative examples, of alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, carboxylic acids, ethers, esters, amines and amides.
2. Write representative equations for organic addition, elimination, substitution, and redox reactions.
3. Discuss the importance of optical isomerism in organic and biochemical compounds, and identify chiral centers.
4. Interpret graphical data of concentration vs time.
5. Calculate a reaction rate from either graphical or tabular data.
6. Determine the reaction order, rate law and/or reaction rate constant from either initial rate data or concentration vs time data.
7. Calculate the activation energy of a reaction from graphical rate data.
8. Demonstrate an understanding of collision theory and transition state theory as they apply to reaction kinetics.
9. Interpret reaction coordinate diagrams.
10. Demonstrate an understanding of the role and mechanism of catalysts in both industrial and biochemical reactions.

11. Define and/or calculate the reaction quotient or equilibrium constant from a balanced chemical equation.
12. Calculate, using the quadratic equation if necessary, the equilibrium concentrations of reactants and products in a chemical reaction.
13. Use LeChâtelier's Principle to predict the effect of a stress applied to a chemical equilibrium.
14. Apply the principles of chemical equilibrium to problems in acid/base, solubility and/or electrochemical equilibria.
15. Calculate pH, pOH, $[H^+]$, $[OH^-]$, K_a , K_b , pK_a and pK_b for both strong and weak acids.
16. Interpret titration curves.
17. Predict the products of acid–base reactions.
18. Demonstrate an understanding of how buffers work, and be able to calculate the concentrations of all species in a buffered solution.
19. Demonstrate an understanding of the basic principles that govern solubility, and be able to predict how the solubility of solids will be affected by pH.
20. Calculate the K_{sp} and/or solubility of a weakly soluble salt.
21. Demonstrate an understanding of the factors that determine the spontaneity of a chemical reaction, and be able to determine if a given reaction will be spontaneous.
22. Demonstrate an understanding of the First, Second and Third Laws of Thermodynamic.
23. Calculate ΔS and/or ΔG for a chemical reaction.
24. Predict and/or calculate how temperature affects the spontaneity of a chemical reaction.
25. Demonstrate an understanding of how redox reactions can serve as a source of electricity, and how electricity can be used to drive non–spontaneous redox reactions.
26. Distinguish between voltaic and electrolytic cells.
27. Calculate the potential of an electrochemical cell under standard and/or non-standard conditions.
28. Apply the principles learned in this class to problems in environmental chemistry, consumer chemistry and/or biochemistry.

Success in achieving these outcomes will be demonstrated by (1) problem assignments, (2) laboratory reports and (3) exams.

Laboratory–specific Learning Outcomes:

In addition to the outcomes above Learning Outcomes specific to the laboratory include the ability to:

1. Keep a well-organized laboratory notebook consistent with the handout “Format for Lab Reports”.
2. Devise experimental procedures.
3. Carry out standard laboratory procedures including filtration, pipetting, solution preparation, dilution, titration, mass analysis, and calorimetric analysis.
4. Use electronic equipment to conduct experimental analyses.
5. Present scientific data in an organized and readable form.
6. Graph scientific data and compute the slope and intercept of a straight line using linear regression.
7. Interpret scientific data and draw appropriate conclusions.
8. Statistically analyze data and draw appropriate conclusions regarding the accuracy and precision of experimental data.

Success in achieving these outcomes will be demonstrated by laboratory reports, prelab assignments, exams and quizzes.

Campus-wide Learning Outcome: *Critical Thinking*: Students will demonstrate the ability to:

1. Recognize and use effective reasoning to evaluate information.
2. Differentiate between observations, such as trends in physical and chemical properties, and the explanation for those observations.
3. Provide reasons for the conclusions they reach and assess the relevance and adequacy of those reasons.
4. Connect past learning with current topics.

Success in achieving these outcomes will be demonstrated by (1) problem assignments, (2) laboratory reports and (3) exams.

Grading Policy

	Points Possible (Approximate)	% of Grade (Approximate)
Midterm Exams (3 exams at 100 pts each) Note: If it helps your grade, your lowest exam score will be replaced with your final exam %.	300	~32%
ACS Final Exam (Comprehensive—covers Chem 161-162-163)	150	~16%
Group Quizzes (Lowest score dropped)	~100	~11%
Lab Reports & Prelab Assignments	~210	~22%
Portfolio of Active Learning Exercises (ALE's)	~135	~14%
Recorder Reports, Strategy Analyst Reports, etc. (Lowest score dropped)	~50	~5%
Total Points Possible (approximate) =		~945

Grades are determined based on a percentage of total points possible:

Percent	Grade	Percent	Grade	Percent	Grade	Percent	Grade	Percent	Grade
95-100	4.0	88	3.3	81	2.6	74	1.9	67	1.2
94	3.9	87	3.2	80	2.5	73	1.8	66	1.1
93	3.8	86	3.1	79	2.4	72	1.7	65	1.0
92	3.7	85	3.0	78	2.3	71	1.6	< 65	0.0
91	3.6	84	2.9	77	2.2	70	1.5		
90	3.5	83	2.8	76	2.1	69	1.4		
89	3.4	82	2.7	75	2.0	68	1.3		

Note:

- Students that earn less than 62%, or who stop coming to class without officially withdrawing by the end of the 8th week of the quarter, will receive a grade of 0.0 ***This grade will be included in college GPA calculations.***
- Keep track of your grades!!!!** It is strongly recommended that you keep track of all of your grades throughout the quarter on the grade record sheet found towards the end of this packet. There are two excellent reasons to do this:
 - If you keep track of your grades on individual assignments, you can calculate your class grade at any point in the quarter.
 - Instructors have been known to make record keeping mistakes. Protect yourself by keeping good records.

Pass/No Credit Grade Option

Students may elect to be evaluated on a "Pass" or "Non-Credit" basis rather than by decimal grades by filing a petition with enrollment services (253-833-9111 ext 2500) no later than the end of the 8th week of the quarter. For students who qualify, the registrar will convert the decimal grade submitted by the instructor either to pass ($P \geq 1.5$) or to no credit ($NC < 1.5$). Any student who does not inform the registrar by the deadline may not choose the P/NC option. **Caution!** Many universities will not award credit for a science or math course with a "P" grade if the course is required for a specific major (e.g. Biology, Pre-medicine, Pre-dental, etc.)

Assessment

Final Exam

The final exam will be a standardized *American Chemical Society* (ACS) exam that will cover the entire year of chemistry. It will be a multiple-choice exam that will be scored and curved based on your performance relative to the score of other students around the country. There will be an opportunity to take a practice exam so that you can get a feel for what these exams are like. The practice exam will not affect your grade. Your final exam percentage will replace your lowest exam score if this improves your grade.

Midterm Exams

Three exams will be given during the quarter. There will be no make-ups and no early exams, however, if it helps your grade, your lowest exam score will be replaced with your final exam %.

Active Learning Exercises (ALE's), Stamps and Group Work

Learning chemistry (and most any subject!) is very much a "learn by thinking and doing" exercise. Because of this you will complete Active Learning Exercises in and outside of class followed by outside of class readings in your textbook and working on homework problems to solidify your understanding of the major topics covered this quarter. Discussing the ALE's with other students in class and working on homework problems outside of class are the major vehicles for learning chemistry this quarter.

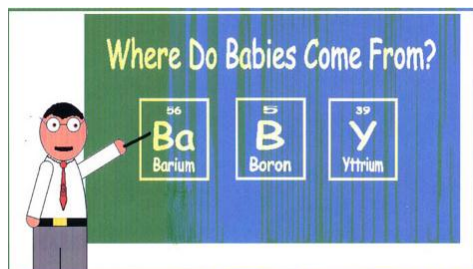
Each and every day you are accountable to arrive with your reading done and your ALE/homework problems completed. *Group work is successful only when all members come prepared to contribute.* Students that habitually arrive unprepared for class tend to do very poorly in this course. Contact your instructor A.S.A.P. if extenuating circumstances keep you from completing your assignments in a timely manner.

Recorder Reports and Strategy Analyst Reports (lowest score will be dropped)

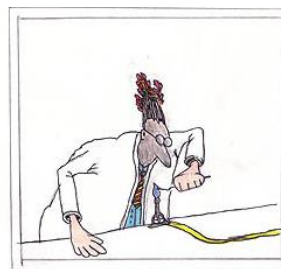
A Strategy Analyst Report and one or more recorder reports may be given each week. The Recorder's Report is based on the daily "ALE," while the Strategy Analyst Report assesses the level and quality of each student's group and class participation for the week.

Group Quizzes and other Group Activities (lowest score will be dropped)

As an incentive for group members to collaborate, collaborative group activities (e.g. group quizzes) will be given. All members of the group receive the same grade so helping to prepare your team members can enhance your own score. Points may be deducted from the scores of individuals that missed activities earlier in the week (~5 pts. per day missed), or a student may elect to do the group exercise individually in place of having attendance points deducted from their score. Let's talk about it if you have a problem with all group members receiving the same score—sometimes it's not justifiable (e.g. "slackers")—Please let me know your concerns.



Due to budget cuts, science and health were both taught by the chemistry teacher!



Larry learns that gasoline wouldn't result in a successful flame test.

Portfolios

- **What's a portfolio?** A Portfolio is file folder containing a collection of ALE's and homework assignments that you complete during the quarter.
- **How is a portfolios organized?** Each assignment should be stapled *individually* and present in the order indicated by the "Portfolio Contents Sheet" that the instructor will provide a few days before each exam. To facilitate the evaluation of the portfolios, do not attach the assignments to the file folder or to each other. After each portfolio is returned to you with a grade, remove all work from your portfolio folder to make room for future homework assignments.
- **When are portfolios due?** A portfolio containing your complete and corrected ALE's and homework assignments will be collected for grading at the start of all exams this quarter—see the quarterly schedule on the last page for specific due dates.

Portfolio Grading Policy

A grade will be assigned to each ALE and homework assignment in your portfolio based on the following criteria...

Score	Criteria for Score
10 points	The assignment has a stamp, all questions are answered <u>neatly</u> and completely; All responses have been checked with your team and/or answer key and corrections made—it's high quality work & quite obvious that a conscientious effort was made.
7 to 8 pts	The assignment has a stamp, but the assignment is not complete, is messy and/or some questions were not checked or corrected.
5 points	The same as for 10 points, but <u>assignment does not have a stamp</u>
2 to 3 pts	The same as for 7 to 8 points, but <u>assignment does not have a stamp</u>
0 points	The assignment <u>does not have a stamp</u> , is very incomplete and of low quality—it's obvious that a conscientious effort was <u>not</u> made to complete the work.

Freebie (FB) Rule:

In each portfolio you are allowed one "Freebie" assignment w/o a stamp. If a reasonable effort has been made to complete the assignment, then the 1st assignment w/o a stamp will be scored as a stamped assignment according to the criteria above. However, the 2nd assignment w/o a stamp follows the scoring criteria above for assignments w/o a stamp.

Follow these guidelines when making correction to ALE's

- "Check" Policy": Indicate if a response is correct by clearly recording a "check", \checkmark , next to the question number of all questions that you have checked with your team and/or answer key and have made corrections to (if needed). Do not delay getting help from your team, a tutor and/or the instructor for any ALE question that you do not understand.
- For incorrect or incomplete responses: Corrections and additions should be clearly indicated by using another color pen or by using a highlighter to highlight the correction or addition. Do not erase incorrect responses—simple cross them out by putting a line through your original answer.
- If space permits, write your corrections/additions next to your original response. Do not erase incorrect responses—simply cross them out by neatly putting a line through your original answer. Be original when making corrections and answering questions. Do not simply copy answers from the textbook, answer keys or from other students—this is of no help to you as little learning will take place.
- Make corrections on separate paper only if there is insufficient space next to your original response. Clearly indicate on the top of the 1st page of the assignment and next to the individual questions that corrections are on separate paper stapled to the last page. Number your corrections as the original questions are numbered.

Lab Notebooks & Prelab Assignments

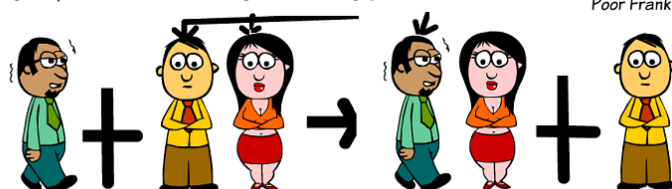
Most Thursdays and occasionally on Tuesday you will perform chemistry lab experiments that are designed to complement topics in the textbook and to develop skills that are typically required of lab technicians and scientists worldwide. Lab reports are often due the week following lab—specific due dates will be announced in class.

Prelab exercises (~5 - 10 points each) are often assigned and are due at the *start* of lab. Keep your lab notebook up to date and complete and be familiar with its contents. Questions that closely reflect lab concepts and calculations will appear on exams.

Classroom Policies

- **Attendance.** Daily participation in class is an important part of your success in this course, and you will be expected to attend at all times. Treat this class as if it were a job: When you cannot be in class it is expected that you will notify the instructor *and* your team of your inability to attend. A voice mail or e-mail message *before* the missed class, or as soon as possible, is sufficient. Be sure to review the "special note" below under "Safety" regarding attendance during pre-lab discussions.
- **Lab Attendance.** Attendance is mandatory for lab. You will not receive credit for any lab you do not attend and 2% will be deducted from your final percentage for the quarter for each lab session you miss. **You will FAIL this course if you miss three or more labs.** Please note that some labs may not be made up.
- **Cell Phone / Electronic Device Policy** To reduce disruptions, and out of respect to the instructor and students, class policy is that all cell phones and all non-note taking devices (including pagers, wireless devices, music players, etc.) must be silenced/turned off and put away during class. Your teacher recognizes that emergencies do happen. If you feel you need to respond to a text or call during class, please leave the room quietly and do so inconspicuously outside the room. You do not need to ask permission, just try not to disturb your fellow students. Exception: During an exam or quiz you will **FAIL** if your cell phone is seen by the instructor or testing center staff, even if it is turned off and not in use.
- **Safety.** Because of the nature of the laboratory portion of this course safety is a concern of utmost importance. You will be expected to observe the following practices:
 - Notify the instructor immediately when a spill or injury occurs.
 - Immediately discuss with the instructor any situation that you feel may be dangerous or cause you discomfort.
 - Use proper, safe techniques regarding personal safety.
 - Use equipment for its intended purpose only, as directed by the instructor.
 - While enthusiastic participation is encouraged, the class will remain an academic environment in which learning can take place.
 - **Special Note:** A student who is not present for the pre-lab discussions of an experiment will not be permitted to remain in the laboratory while the rest of the class is conducting that experiment, nor will s/he be permitted to conduct that experiment at another time.

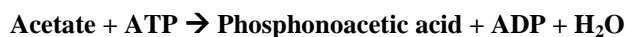
In a single-replacement reaction this girl leaves her guy for Joe.



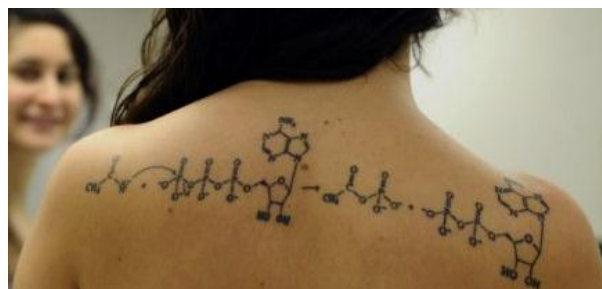
Now Joe and Mary are together

Classroom Policies (cont.)

- **Late Work Policy.** Students are expected to turn in all homework assignments and laboratory experiment reports on the announced due date, unless **prior** to that time, permission has been granted to turn in the material late. An assignment is late if it is due at the start of class and it is not turned in at that time, or if an assignment is due at the end of class and the assignment is not turned in at that time. Extenuating circumstances do occasionally occur—Contact the instructor *before* an assignment is due if you are unable to meet deadlines due to an emergency.
 - **Graded assignments** (e.g. lab reports). Late work will be penalized as follows: **10%** off per day late—maximum 4 days late. *No credit if more than four days late*. Assignments due on a Friday that are turned in on the following Monday will be penalized **20%**.
 - **Stamped assignments** (e.g. ALE's and homework assignments). Turn your work in on time—late work will not get stamped!! An assignment is late if it is due at the start of class and it is not turned in at that time, or if an assignment is due at the end of class and the assignment is not turned in at that time
 - **Exams.** Midterm exams may not be taken early, nor made up if missed—however, if it helps your grade, your final exam percentage will be used to replace your lowest midterm exam score. *Under no circumstances can the final exam be taken early.*
- **Student Conduct.** Students are expected to conduct themselves in an appropriate manner just as they would outside the academic environment. Inappropriate conduct will be addressed verbally as a first warning. The second offense will be addressed in writing to the student and the Dean. The third offense may result in permanent removal from class. (WAC 132J-125-210)
- **Academic Honesty.** You are encouraged to study with other students in this course, but you are expected to do your own work on ALE's, quizzes, exams and lab reports. Students are to produce original work. Another person's ideas, data, graphics, or text may be used *with permission* of the creator of the work *if the original source is given credit*. **Plagiarism** occurs when you knowingly submit someone else's ideas or words as your own. Plagiarism is an act of intentional deception that not only is dishonest, it robs you of the most important product of education—learning. Should I suspect that you have plagiarized, I will talk with you one-on-one and ask you to prove that the work in question is your own. If you are found guilty of academic dishonesty, you will automatically fail that assignment. If you are caught plagiarizing again in the same quarter, you will fail this class. Examples of plagiarism include copying on exams, copying assignments, falsification of data or calculations, supplying an assignment, data, etc. for another student to plagiarize, etc. Take note that a person that allows their work to be plagiarized is just as guilty as the one copying the work. Academic dishonesty will not be tolerated and can result in failure of this course and a letter sent to the Dean. (WAC 132J-125-200)
- **Antidiscrimination.** Discriminatory/derogatory language or actions regarding race, gender, ethnic/cultural background, sexual orientation, and physical/mental abilities will not be tolerated.

A true biochemist...

(It's a dehydration synthesis reaction and she needs to add water as a product!)



Guidelines for Completing Chem 163 Active Learning Exercises (ALE's)

1. **Overview.** Strive to have all assigned questions completed with quality responses by the due date for each ALE. Start as far in advance of the due date as possible—don't sit down shortly before it is due and attempt to complete the whole assignment in one shot—little long-term learning will occur if you do so! With a diligent effort most students can complete 80-90% of the questions without much outside help. However, don't panic if you do not understand everything on the ALE before coming to class. This is to be expected! Use class time with your team and, if needed, instructor office hours to tie up loose ends!
2. **Strategies for completing an ALE.** Read and carefully study the "Model" on the ALE and then answer the "Key Questions" and "Exercises" that follow it. Now use your textbook as a resource: find the relevant chapter and section(s) in your book (found on the first page of the ALE). To get an overview of the chapter read the chapter's introduction, the sectional headings, the captions of all diagrams/illustrations and then the chapter summary at the end of the chapter. Now read the sections relevant to the ALE and work through all sample problems similar to those on the ALE. Now go back to the ALE and reexamine with a critical eye the model and your responses to the Key Questions and Exercises. Make corrections and additions to your responses as needed. Again, it is not expected that you get everything correct before coming to class with your ALE—what we expect is a good faith effort to have completed it to the best of your ability before you spend class time discussing the ALE with your team and coming to a consensus about the answers to the Key Questions and Exercises. Make corrections to your responses while discussing the ALE in class according to the guidelines on page 4 of the syllabus.
3. **Using the Book's Index.** Avoid the temptation of simply scanning the index of your book for the pages of the book that relate to a particular question and transcribing portions of the textbook onto the ALE. Although you will get some nifty sounding answers, you will have learned and retained very little in the process.
4. **Plagiarism.** Don't complete your ALE by copying answers from your friends and classmates. To do so prevents you from learning anything. You will get out of this collaboratively taught class only what you put into it. The process starts with you alone thinking about the ALE's, finding pertinent information and formulating answers. If you find yourself copying or wanting to copy answers from other students because you are not ready and have not done the work required, you should consider dropping the course. Without individual effort on the ALE's you will not succeed in learning very much and the group activities will make you feel uncomfortable because your mastery of the material will be well behind the rest of the class.
5. **Put Answers in your own words.** When you can formulate an answer to a question in your own words, you have mastered the concept and should do well on the exams. If you have copied answers (either from the text or a friend) you have only gotten practice in writing and have learned little to nothing at all. Because you will not have your friend or text to copy from during the exam, you will do poorly. Memorization gets you nowhere in this class—learning major concepts gets you everything.
6. **Alternate Resources.** Sometimes you will not find all the information you need to properly formulate your answers to the ALE questions. If this is the case, you will need to consult other resources, such as online resources, the library, a dictionary, etc.

The Road to Success—Some Tips...

1. Stay focused: don't let life's distractions derail you from your personal, academic and/or career goals:
 - Keep a positive attitude.
 - Dedicate your energy towards actions that will help you to be successful.
 - Work hard to achieve your goals, and
 - Have confidence in yourself!
2. If you need extra help in this class (or any other class!), take advantage of the instructor's office hours and the help center in the 2nd floor of the Holman Library.
3. Visit the [Instructor's](#) and the [Textbook's](#) web pages for this class often since they have many useful study aids and practice problems.
4. Many students benefit greatly by being involved in a study group consisting of other members of this class. If you wish, exchange phone numbers and email addresses A.S.A.P. with a few people in this class.
5. Be intellectually active in class: participate actively in class discussions and ask questions.
6. Do the assigned reading and complete the Active Learning Exercises *before* the material is discussed in class. Make a list of questions you have concerning the assigned reading and/or the questions on the weekly Active Learning Exercises. Be sure to get clarifications during class time, with your study group, and/or during office hours.
7. Review and rewrite your class notes and the relevant material in your textbook *immediately* after class or as soon as possible.
8. Study daily: Develop a study plan in which you will study for this class at least 2 hours daily 7 days a week. Just as one cannot train for a marathon by training sporadically for several hours at a time, one can't study sporadically for long periods of time and expect to learn with retention. Regular study sessions of one-hour duration or less are more effective than massive cram sessions.
9. Isolate yourself from distractions while studying.
10. Study efficiently: Don't waste too much time on a tough problem or concept. Go on to the next problem and come back to the real stumblers later. Get help as needed from your fellow classmates and from your instructor. Often it's only a few small details that may keep you from understanding something— what seems like a major stumbling block might in reality be something minor!
10. **Studying for an Exam**
 - o Learn from your instructor the type of exam (essay, multiple choice, etc.)
 - o Study regularly throughout the quarter
 - o See the class website for study guides and practice questions.
 - o Set up a study schedule and review all materials well before the exam.
 - o Write out likely questions and answer them.
 - o Form a study group, discuss the materials you will be tested on, and quiz your partners.
 - o Get enough rest the night before the exam.
11. **Taking a Multiple Choice Exam**
 - o Read each question carefully—underline key words within each question.
 - o Before looking at the possible answers, form an answer in your mind.
 - o Read each possible answer before making a choice.
 - o Watch for words such as *always*, *never*, *only*, or *except*.
 - o Don't change your initial answer unless you are *absolutely certain* it's wrong.
12. **Taking an Essay Exam**
 - o Survey all essay questions and note the questions that are easy for you.
 - o Estimate how much time you have to answer each question.
 - o Answer easier questions first to build your confidence.
 - o Read each question several times to ensure that you understand what is being asked—underline key words such as *analyze*, *discuss*, *define*, or *describe*.
 - o Take a few moments to brainstorm and create a rough outline of your response.
 - o Support each major idea with specific examples and detailed information.
 - o Remember to begin each answer with an introduction that gives an overview of you response.
 - o Conclude by briefly summarizing your answer.
- [How to Boost your Learning Skills](#). Do you run out of time on **exams**? Do you struggle to finish **reading** assignments? Is **Time Management** your Achilles heel? Have your grades reached a plateau? Check out the [Chem 163 Homepage](#) for tips to boost your learning skills.

Chem 163 Section B – Tentative Schedule – Spring 2014 – K. Marr

Caution! This schedule is only approximate and is subject to change!

Week Starting	Topic		Reading	Lab (Thursdays—unless stated otherwise)	
Week 1. March 31	Unit 1. Chemical Kinetics	<ul style="list-style-type: none"> • Factors that affect reaction rate • Reaction rates and reaction laws • Reaction mechanisms • Catalysis 	Chapter 16	<ul style="list-style-type: none"> • Lab Check in • Lab 1. Kinetics of the Iodine Clock Reaction 	
Week 2. April 7				<i>Lab Day: Tuesday</i> Finish Lab 1. Kinetics of the Iodine Clock Reaction	
Week 3. April 14	Unit 2. Chemical Equilibrium	<u>Exam 1:</u> Take in GRCC Testing Center <i>outside</i> of class time either Wed. 4/16 or Thurs. 04/17/2014—your choice. Bring picture I.D. <ul style="list-style-type: none"> • Portfolios Due on Friday 04/18/2014 • Equilibrium state, equilibrium constants, K_c and K_p • Solving Equilibrium problems • Le Châtelier's Principle 	Chapter 17	Lab 3. Le Châtelier's Principle	
Week 4. April 21		Monday 4/21/14 Faculty In-service: No daytime classes <ul style="list-style-type: none"> • Acid-base equilibria; Hydronium ion • Acid-base strength; pH Scale 	Chapter 17	Lab 4. Determination of an Equilibrium Constant	
Week 5. April 28		<ul style="list-style-type: none"> • Arrhenius, Brønsted–Lowry, & Lewis Acid–Base Definitions • Acid–Base Buffer Systems 	Chapter 18	<i>(Lab Day: Tuesday & Thursday)</i> Lab 5. 5A. K_a and K_b from pH 5B. Buffers and pH Changes	
Week 6. May 5		<ul style="list-style-type: none"> • Acid-Base Titration Curves • Solubility and K_{sp} 	Chapter 18 Chapter 19	Lab 6. Titration Curves	
Week 7. May 12		Exam 2: Thurs 05/15/2014 in SC-323; Portfolios Due at start of exam <ul style="list-style-type: none"> • Predicting Spontaneous Change • Entropy, Free Energy and work 	Chapter 20	Exam 2 Thurs 05/15/14 in SC-323; Portfolios Due at start of exam	
Week 8. May 19		Unit 3. Thermodynamics and Electrochemistry	<ul style="list-style-type: none"> • Free Energy and Equilibrium • Half Reactions; Electrochemical Cells Voltaic Cells • Cell Potentials 	Chapter 20 Chapter 21	Lab 7. Thermodynamic Prediction of Precipitation Reactions
Week 9. May 26			Mon. May 26, 2014 Memorial Day: Campus closed <ul style="list-style-type: none"> • Free Energy and Electrical Work • Electrolytic Cells 	Chapter 21	Lab 8. Electrolytic Cells Lab Check-out
Week 10. June 2	<u>Exam 3:</u> Take in GRCC Testing Center <i>outside</i> of class time either Wed. 06/04 or Thurs. 06/05/2014—your choice. Bring picture I.D. <u>ACS Practice Exam:</u> Take in class this week in SC-323; Date T.B.A.		Chapter 21	T.B.A.	
Week 11. June 9	<ul style="list-style-type: none"> • Tues. June 10 Study Day: No daytime classes; But ... 10 to noon: Review/Question Session in SC-323 (Attendance is optional) • ACS Final Exam: 11a.m. – 1 p.m. Wed. 6/11/2014 in SC-323 • Portfolios Due at start of final exam 		No lab this Week		