

Syllabus for Chemistry 102, Spring 2018

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Required Materials

- ✓ General Chemistry: Principles and Modern Applications, by Ralph H. Petrucci, et.al., © 2017 ISBN-13: 978-0-13-293127-1 with MasteringChemistry™ with full e-text and electronic student solutions manual
MasteringChemistry™ course ID: **MILLIGAN102SPRING2018**
- ✓ Lab Manual for Chemistry 102, Department of Chemistry, Los Angeles Valley College, © 2017.
Download from: http://www.ars-chemia.net/Classes/102/manual/102_manual_index.htm
- ✓ Student Lab Notebook, Hayden-McNeil, ISBN-13: 978-1-930882-50-8.
- ✓ HGS Molecular Model Structure Kit, available online (at <http://goo.gl/GfQUFh>: look for 1005 (good for 101/2 and really good for 211/2))
- ✓ Safety in Academic Chemistry Laboratories, Vol. 2, Published by the American Chemical Society: ISBN 0-8412-3863-4. Download from <http://goo.gl/xtVyZ2>. This is required reading **before** any laboratory work is started.
- ✓ Scientific Calculator (it must be capable of scientific notation and logarithms)
- ✓ Safety Goggles (they **must** be the type that completely covers your eyes with the elastic band, no shop goggles!).



Student Learning Outcomes

Solve chemical problems involving kinetics, equilibrium, thermodynamics and electrochemistry.

If you are a student with a disability requiring classroom accommodations, and have not contacted SSD (Service for Students with Disabilities), do so in a timely manner. SSD is located in the Student Services Annex, Room 175 or call SSD at (818) 947-2681 or TTD (818) 947-2680 to meet with a SSD counselor. If SSD has already sent the memo to instructor confirming accommodations required by student for this class, please meet with me to discuss arrangements.

NOTE: If you stop attending a class (or wish to drop a class) on or before May 6, 2018 for Spring Semester 2018, you must drop the class yourself – officially – over the Internet. Failure to do so may result in a grade of “F” in that class.

Course grading

There will be no extra credit given! The time to start worrying about your grade is now, not in the 12th week of the semester. The grading in this course is on a straight scale.

| | | | |
|-------------------|---|-------------------|---|
| 90% - 100% | A | 60% - 69.9999...% | D |
| 80% - 89.9999...% | B | <60% | F |
| 70% - 79.9999...% | C | | |

Any or none of these borders may be moved at my discretion at the end of the semester. **There will be no curve!** First, there are not enough students to have a curve; you need at least 200 students to have any type of bell curve. Second, your grade in this class should **not** depend on the students who are in the class with you.

Distribution of points in the course

During the course of this semester, you will have 3 90-minute mid-term exams that are worth 150 points each (450 points total). The final exam is worth 300 points. The labs are worth a total of 885 points. The MasteringChemistry™ assignments will be worth 400 points. If ½ of your final exam score is greater than the least of your mid-term exam scores it will replace the least mid-term exam score.

| | |
|------------|-----|
| Exams | 450 |
| Laboratory | 885 |

| | |
|---------------------|------|
| MasteringChemistry™ | 500 |
| Final exam | 300 |
| Total | 2135 |

Final Exam

The final exam for this class is on Wednesday, 30 May 2018 at 10:30 a.m. until 12:30 p.m. No make-up finals will be given after this date. **You should start studying for your final exam today!**

Cheating

Cheating, representing someone else's work as your own or using materials or references that are not allowed, will not be tolerated. Students caught cheating will receive a zero for that assignment. If you feel the need to cheat, please do not take this class. Please refer to the Student Code of Conduct in the college catalog.

Attendance

You are expected to attend all class sessions. If you miss more than the equivalent of a week of classes without a valid excuse (illness, etc.) you will be excluded from the class.

Cell Phones

No cell phones will be on while class in session. If your cell phone rings during class, you will be asked to leave the class and this will count towards the week of absences as described above.

What is expected of you...

- i. This is a college level course. As such, it requires 2-3 hours of work outside of class for every hour in class. This class meets approximately 10 hours a week so you should study at least 20 to 30 hours a week outside of class (this is a minimum, you will require more time if you are having difficulty with the material).
- ii. I expect the students in my class to put forth the effort required for them to learn the material. I am here to **help** you learn the material. I cannot and will not learn it for you.
- iii. I expect you to ask me any questions you have or to further explain what it is you don't understand.
- iv. I expect you to use the office hours to your advantage. I have office hours scheduled (see the first page) so that you can have the opportunity to ask me questions outside of class. You can also ask questions during lab periods.
- v. I expect you to do the suggested study problems listed at the end of this syllabus. If you do not do at least all of the suggested problems, you cannot expect to do well on the exams. See also the explanation of the method for studying with the suggested problems at the top of that page.
- vi. I expect you to treat me and the other students in this class with respect.
- vii. I expect you to follow the rules set forth in this class and on this campus.

What you can expect from me...

- i. You can expect me to do the best I can to explain the material to you. If you do not understand it the way I am presenting it, challenge me to use my creativity to explain it in a different way so that you do understand it.
- ii. You can expect me to be clear in what my grading policies are. They are laid out for you in this syllabus.
- iii. You can expect me to get assignments graded and back to you in a timely manner. I will try to get them back to you within a week.
- iv. You can expect me to be fair in grading your assignments. If you think something is unfair, ask me about it and I will explain my reasoning to you.
- v. You can expect me to treat you with respect. If I appear to be disrespectful to you, let me know so I can rectify the problem.

Reading Journal

You should make the most of your textbook; you paid a lot of money for it. Some ways to get the most out of it include reading the text, working the recommended end-of-chapter problems and using the end-of-chapter study guides. My former students will tell you that you have to read the book and you have to work the problems.

Keeping a journal is a new (to you) approach to reading your textbook. Buy a 100-page composition notebook and divide the book into three sections. Use roughly the first half of the notebook for section one and then divide the other half about equally. Set aside a couple of pages at the very front for a table of contents. Use one of the smaller sections to keep a vocabulary list; use the other smaller section for a list of equations. As for the big section, this is your Reading Journal.

1. This is how to read a chemistry text book. You probably already know that a chemistry text is not the same as a history text and you definitely can't read it like you would your favorite novel. Before you begin to read a new chapter do the following:
 - i. Look at the chapter outline on the first page of each chapter to get an idea of the major topics the chapter covers.
 - ii. Flip through the chapter page-by-page looking at the section labels, which should be the same as in the chapter outline, the figures and the figure legends. Read the figure legends.
 - iii. When you get to the end, briefly study the "Chapter Perspective" noting in particular the Concepts that you should understand and Skills that you should master by the time you finish studying the chapter. This should give you a good idea of what to look for while you are reading.
2. The entries that follow will be your "reading notes." Begin a new page in your Reading Journal. Make sure you have some label to show which chapter the notes refer to.
 - i. After skimming the chapter, you should be able to sketch an outline of your own. Write your outline in the Reading Journal.
 - ii. As you read the first section write a one-sentence summary of each paragraph. When you finish the section write a single sentence that summarizes the whole.
 - iii. Remember that equations, data tables, graphs, figures and most pictures are almost always related to the words in the paragraphs on the same page. So for each equation, data table, graph, figure or picture, write a sentence or two that explains how it is related to the text.
 - iv. After reading the first section of the chapter, work out the practice problems for that section at the end of the chapter. Do as many of these problems as you need to in order to be sure that you are comfortable with the material and the problems that can be asked.
 - v. As you begin to read the second section, do the same. Keep doing this for each section.
 - vi. When you finish the whole chapter, write a brief paragraph summary. Please do not paraphrase the section summary!
 - vii. Also, create an "exam" from the additional and cumulative skills problems to test yourself with the material for that chapter. Pick 6 or 7 problems and work them as you would for an exam. Set a timer for 90 minutes and allow yourself to only use your periodic table, 3"x5" index card and your calculator. Get answers for all of the problems and check them only after the timer has expired.
3. A word of advice, this Reading Journal will be more beneficial if you write your own paragraph (in your own words summarizing what you thought was most important) than if you copy or paraphrase the section summaries found in the text.
4. Make a habit of reading a bit each day and record your entries as you go (daily or weekly). **Do not** wait until the night before the exam; it is not time well-spent and will defeat the purpose of the journal.
5. Create a section in your Reading Journal where you keep a list of vocabulary words.
6. Set aside a few pages for a list of important formulas. Write down the mathematical formula, what it is used for, and what the terms in the formula mean.

"All mankind are chemists from their cradles to their graves... The Material Universe is a chemical experiment."
- John Adams

Exams

For all exams remember that chemistry is a cumulative subject. Any material from Chemistry 101 or earlier in Chemistry 102 can appear on any exam.

1. The first exam covers chapters 13 through 14 and will be on Wednesday, 1 March 2018. You will be expected to be able to:
 - a) Determine the minimum entropy change for a chemical process
 - b) Calculate the free energy change for a reaction
 - c) Determine if a reaction is spontaneous at a given temperature
 - d) Determine the temperature at which a reaction becomes spontaneous
 - e) Calculate the thermodynamic equilibrium constant for a reaction and equilibrium quantities
 - f) Calculate the effects of temperature and pressure on solubility
 - g) Calculate the colligative properties of solutions (vapor pressure lowering, freezing point depression, boiling point elevation and osmotic pressure)
 - h) Use amounts of substances to calculate the vapor pressure of solutions and the composition of the vapor
 - i) Use any of the colligative properties to determine the molar mass of solutes
2. The second exam covers chapters 15 through 18 and will be on Wednesday, 12 April 2018. You will be expected to be able to:
 - a) Solve for an equilibrium constant from conditions at equilibrium
 - b) Solve for equilibrium concentrations from initial conditions and the equilibrium constant
 - c) Determine the change in equilibrium from Le Châtelier's principle
 - d) Calculate the pH and pOH of a solution of a strong acid or base
 - e) Determine if a solution is acidic or basic given the pH or the hydronium ion concentration.
 - f) Determine if one acid is stronger than another from molecular structure
 - g) Demonstrate a knowledge of different acid/base definitions
 - h) Determine the pH and pOH of a solution of a weak acids or bases or their salts
 - i) Determine if a solution is a buffer and calculate its pH
 - j) Demonstrate a knowledge of the various regions and points on a titration curve and calculate the pH at a given point
 - k) Solve for the molar solubility of slightly soluble compounds
 - l) Solve for the solubility of slightly soluble compounds in g/100 mL of water
 - m) Solve for the solubility of slightly soluble compound in the presence of a common ion
 - n) Solve for the solubility under acidic or basic conditions
 - o) Solve for the equilibrium concentration of a metal ion in the presence of a complexing agent
 - p) Solve for equilibrium concentrations in a combination of solubility and complex ion formation
3. The second exam covers chapters 19 through 20 and will be on Wednesday, 10 May 2018. You will be expected to be able to:
 - a) Determine the cell potential of a reaction
 - b) Write the cell notation of an electrochemical cell
 - c) Determine the thermodynamic equilibrium constant of an electrochemical cell and equilibrium quantities
 - d) Determine the cell potential of a reaction under non-standard conditions
 - e) Calculate the current, the time needed to produce a given amount of metal or the amount of metal produced in an electrolytic cell
 - f) Solve for the rate law from a set of initial conditions
 - g) Solve for a rate constant, temperature or the activation energy under given conditions.
 - h) Utilize the integrated rate law to solve for final concentration, time or half-life.
 - i) Determine the rate law from a given mechanism.

Laboratory Work

The laboratory work for this class is worth a total of 789 points of your overall grade (see lab schedule). In the laboratory, when any lab work is being performed, everyone is expected to wear eye protection. If I have to remind anyone of this rule more than twice in a given lab period, you will be removed from the lab with the loss of points for that lab. **You are expected to come to lab prepared.** This means that you are to have read the introduction to the lab and the directions for the lab. If you have any questions about the lab, feel free to ask me. **Do not ask me what you are supposed to do in the lab.** That is why you have a lab manual. I will, however, answer any questions clarifying the instructions in the lab manual. Labs are due at the beginning of the class period when you walk in. Late labs will be accepted with a loss of points according to the following schedule:

| | |
|-----------------|----------------------|
| Late on day due | -50% of report value |
| After day due | No Credit |

Suggested Study Problems from the Petrucci, et. al. Textbook, 11th edition.

Exam 1:

Chapter 13: 81, 83, 87, 90, 93, 97

Chapter 14: 88, 91, 92, 95, 105, 107, 109, 111

Exam 2:

Chapter 15: 80, 82, 85, 86, 95, 98

Chapter 16: 82, 87, 94, 100

Chapter 17: 63, 64, 70, 73, 81

Chapter 18: 67, 69, 71, 74, 80, 83, 87, 89

Exam 3:

Chapter 19: 75, 80, 82, 96, 105, 107

Chapter 20: 75, 84, 87, 90, 95

Final Exam:

All of the above

Chapter 24: 39, 51, 54, 57, 64

Chapter 25: 59, 62, 63, 64

Lecture and Laboratory Schedule for Chemistry 102, Spring 2018

| Week of | Lecture Chapters | Exams and Holidays | Monday/Tuesday | Wednesday/Thursday |
|--|---------------------|--|---|--|
| 5 Feb | 13 | | Lecture | Lecture Safety & Check-In (5 pts) |
| 12 | 13 & 14 | | Lecture Maintaining a Laboratory Notebook (10 points) | K_{sp} , ΔG° , ΔH° , and ΔS° of KNO_3 Solubility (40 pts) |
| 19 | 14 | <i>Monday Holiday</i> 19 th last day to add 19 th Last Day To Drop (LDTD) w/o fees or getting a "W" | <i>Monday Holiday</i> Tuesday Lecture ☺ | Vapor Pressure of a Solution (36 points) |
| 26 | 15 | Wednesday, Exam 1 | Freezing Point Depression (50 points) | Lecture |
| 5 Mar | 16 | | Le Châtelier's Principle (42 pts) | Weak Acids & Bases (40 pts) |
| 12 | 16 & 17 | | Acid/Base Equilibrium Problems (50 pts) | Buffers & pH (36 pts) |
| 19 | 17 & 18 | | Determination of K_a by pH Titration (52 pts) | Solubility Investigation (31 pts) |
| 26 | 18 | <i>Thursday Holiday</i> | Determination of K_{sp} by Iodometric Titration (34 pts) | <i>Thursday Holiday</i> Wednesday Lecture ☺ |
| 2 Apr | Spring Break | | | |
| 9 | 19 | Wednesday, Exam 2 | Determination of K_f by Spectroscopy (65 points) | Determination of Percent Oxalate by Oxidation-Reduction Titration |
| 16 | 19 | | Determination of Percent Oxalate by Oxidation-Reduction Titration | Determination of Percent Oxalate by Oxidation-Reduction Titration (62 pts) |
| 22 | 20 | | Electrochemistry (55 pts) | Determination of Molar Mass of Lead by Electrolysis (25 pts) |
| 30 | 20 & 24 | 6 th LDTD w/ a "W" | Factors of Kinetics (20 pts) | Chemical Kinetics (46 pts) |
| 7 May | 24 | Wednesday, Exam 3 | Equilibrium Between Two Co^{2+} Complexes (50 pts) | Synthesis and Analysis of a Ni^{2+} Complex |
| 14 | 25 | | Synthesis and Analysis of a Ni^{2+} Complex (66 pts) | Molecular Models of Transition Metal Complexes (30 pts) |
| 21 | 25 | | Determination of the Half-life of ^{40}K (35 pts) | Clean Locker & Check Out (5 pts) |
| Final Exam—Wednesday, 30 May 2018, 10:30 a.m. | | | | |

*The capacity to learn is a gift
The ability to learn is a skill.
The willingness to learn is a choice.*

Declaration of Understanding

I hereby declare that I have read the syllabus for this class and understand the rules of this class. I also understand that any failure on my part to follow the rules of this class will result in the above mentioned penalties.

| | | |
|---|---------------|-----------|
| | | |
| Print Name | Sign Name | |
| | Chemistry 102 | |
| Date | Class | Section # |
| | | |
| E-mail address (required in order to receive grade updates) | | |

** Failure to complete and turn in this page by 14 February 2018 will result in a deduction of 20 points from your overall grade. These points are forfeit and cannot be made up at a later time.

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