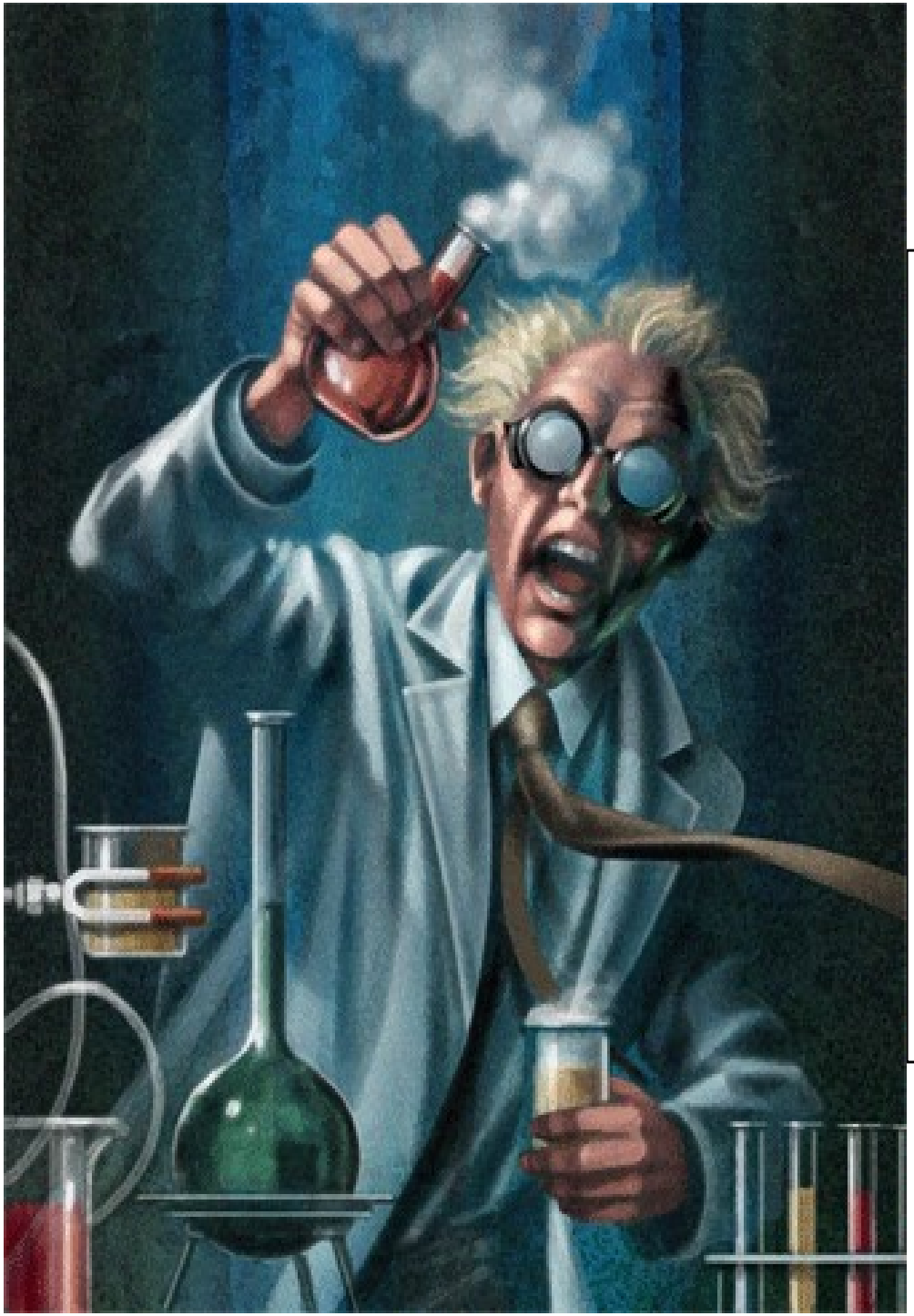


CHEM 1224/1220 Syllabus

Spring 2016

Lindsey Wilson College

Columbia, KY

Dr. Kalvin Gregory

About your professor……

Tall. Ruggedly handsome. A confirmed misanthropist, he occasionally enjoys pretending to run for his life in crowded places. Champion hog caller, Yell County, South Dakota 1988. Winner of the 10th annual Donnie Osmond look-alike contest, Buzzard's Toe, Ky, 1995. During a brief stint as an ambulance driver, he gained notoriety by teaching himself to play "Yankee Doodle" on the soprano ambulance siren. Holds a 10th degree black belt in infuriation. As a provocateur, he regards himself a professional. His sarcasm has been known to kill small birds in mid-flight at 100 yards. He has perfected the "Withering Stare" to such a degree that he can open an oyster shell at 60 feet with a single glance. Loves extension cords. Is not allergic to shellfish. Fly fishes WAY too much. Currently holds the world's record for the most split infinitives used in one evening's conversation. So self-effacing, he is considered a public nuisance in five states. Righter of wrongs. Writer of songs. Manufacturer of quality footwear.

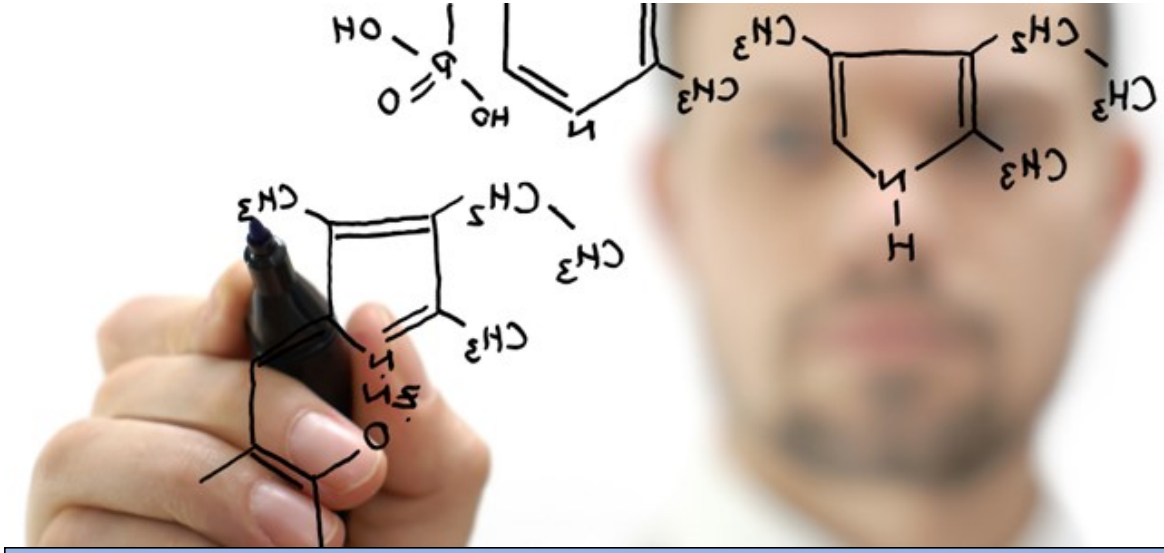
Contact Information

Office: 330 Fugitte

Office Hours: Posted on Blackboard or by appointment and commonly by walk-ins.

Also use email gregoryk@lindsey.edu for most communication. Ph = 270-384-7462

ALL COMMUNICATIONS FOR THIS COURSE WILL BE THROUGH YOUR LWC CAMPUS EMAIL!



General Chemistry II w/Lab, Chem 1224 (4 credits) LWC
30198 CRN (M-01) 30199 CRN (M-02) Fall 2015

General Chemistry II Lab, Chem 1220 (0 credits) LWC
30196 CRN (M-01) 30197 CRN (M-02)

A 3 credit lecture format course with 1 added experiential/practical lab credit for a total of 4 credits.

Course Description: Continuation of General Chemistry I, this course deals with kinetics, equilibria, acids and bases, solutions, pH, radiation, and biological compounds. A two-hour laboratory series is included which correlates with the course's concepts. Prerequisite: CHEM 1214. Course rotation: Spring. GE CORE - INQUIRY & ANALYSIS - NATURAL SCIENCE

Prerequisite: MATH 1113. *Course rotation:* Fall.

Class times

Lecture

M-01 MWF 8:30-9:20 a.m. Fugitte 324

M-02 MWF 9:30-10:20 a.m./p.m. Fugitte 324

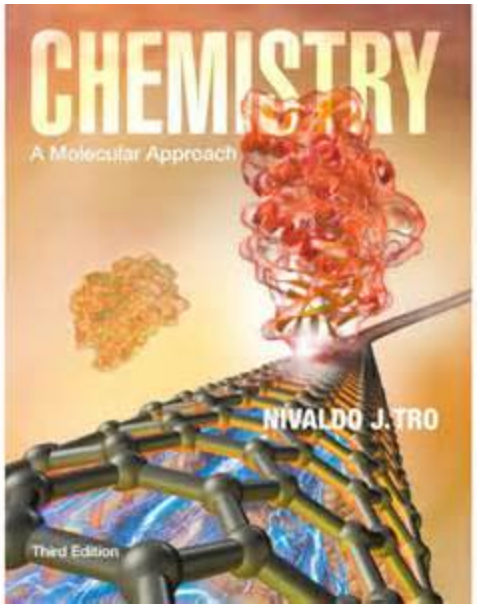
Lab

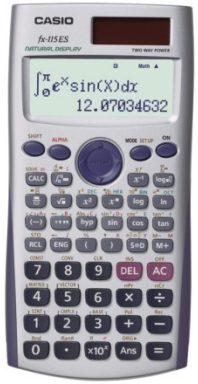
M-01 R 8:30-10:20 a.m. Fugitte 303

M-02 R 11:00 -12:50 p.m. Fugitte 303

Education Program Preparation:

This course is required for content preparation in the Biology Secondary Education Program as well as the Middle Grades Education Program, and prepares teacher candidates with the knowledge base required in the Kentucky Core Academic Standards and the College Career Readiness Standards. The Conceptual Framework of the Education Program, “Teacher as Leader for the 21st Century”, is incorporated. The Division of Natural and Behavioral Sciences works with the Education Program in preparing the teacher candidates with the knowledge base required to meet Kentucky Teacher Standard I and the Education Program Student Learning Outcome for Content Knowledge. Teacher candidates will be equipped to teach K-12 students and meet requirements for Unbridled Learning.





Required Texts

Chemistry: A Molecular Approach, 3rd edition, by Nivaldo J. Tro, Publisher: Prentice Hall; 3rd edition (January 18, 2013), **ISBN-10:** 0321809246, **ISBN-13:** 978-0321809247

Required Equipment

You will need a USB flashdrive/thumb drive, etc. so that you can store experimental data gathered in the laboratory for further use when completing your lab write-ups. You will also need a *non-programmable* scientific calculator.

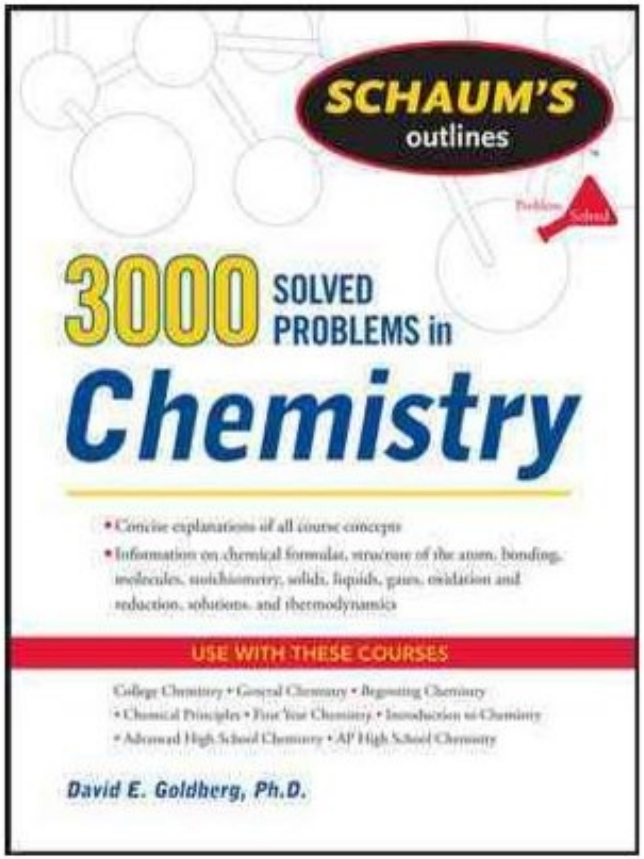
NO CELL PHONE CALCULATORS ARE ALLOWED ON EXAMS!

<u>Suggested reading:</u>

Schaum's Outlines: 3000 Solved Problems in Chemistry

David E. Goldberg, Ph. D.
2011, McGraw-Hill, ISBN 978-0-07-175500-9

This book contains 3000 chemistry problems *with* solutions, and is an excellent study aide



GOALS & OBJECTIVES

This course is part of the requirements for the Biology (B. A. major/minor, A. A), Chemistry minor, Health Sciences, and Engineering Mechanics programs. It may also satisfy General Education Requirements of other majors.

This course will cover the topics listed in the tentative lecture/reading and exam schedule included later on in this document. The textbook for the course will be used as a *companion* to my lectures, as well as a source of practice problems for preparation for the exams. Therefore, attendance to lectures is necessary for success in this course. I reserve the right to delete topics from the course, or to slightly change the timeline given in the tentative lecture and exam schedule. Sometimes things happen, and adjustments have to be made.

STUDENT LEARNING OUTCOMES (SLO's) for this course.

Program SLO's:

Why is chemistry important? What should I get out of this class?

1	To understand the concepts of chemistry, which is a fundamental science relevant to success in a variety of degree/pre-professional programs, including, but not limited to: biological sciences, pre-medical, pre-dental, pre-physician's assistant, pre-engineering, pre-pharmacy, and pre-physical therapy.
	• This class surveys a broad scope of chemical topics relevant to the programs listed above. The understanding gained from this course should provide a thorough foundation for future major-specific topic areas.
2	To apply basic chemistry laboratory skills to solve problems.
	• Students will develop a feel for how science is done in the real world, which differs markedly from what is typically done in a lecture-only course.
3	To learn how to apply the scientific method to problems and projects in chemistry.
	• Understand these concepts well enough to apply them in a real-world scenario, where every day will seem like a final cumulative exam.
4	To learn how to communicate effectively using scientific language.
5	**Laboratory Skills:** Students will demonstrate proficiency in the following laboratory procedures, rote skills, theoretical understanding of procedures and techniques, as well as personal responsibility in the lab with regards to cleanliness, safety, equipment maintenance, and finally, interpersonal skills. Proficiency in these areas will be assessed according to the Laboratory Skills VALUE rubric. This SLO will be evaluated by the course Signature Assignment described elsewhere.

Institutional SLO's

Inquiry and Analysis

Students will demonstrate an ability to comprehend quantitative data, such as charts, graphs, figures, as well as raw lab data. Students will also demonstrate proficiency in making informed conclusions and judgements, as well as breaking down complex topics in order to better understand them. Assessment will be done according to the Inquiry and Analysis VALUE rubric.

Inquiry and Analysis: Description of the Signature Assignment

Students will write a 5-10 page paper discussing the application of the scientific method to a topic relevant to professions for which general chemistry is a core requirement (e.g. medical, dental, pharmacy, etc.) Students will be required to demonstrate application of a systematic approach to research to a student-chose topic specific or at least relevant to their discipline. Examples might include current developments in clinical laboratory chemistry, disease pathologies, pharmacology, drug discovery medicinal chemistry, etc. Such an exercise will enable the student to gain an understanding of science in application, as well as how critical/analytical thinking skills, in combination with a systematic method of inquiry are applied to a real problem.

Lab skills assessment:

For the final lab period, students will be asked to perform an experiment in a guided-inquiry format, which leaves them largely to their own devices in gathering and interpreting the data.

The lab will require them to carry out procedures using numerous common laboratory skills, and to work in a team environment.

Assessment of this assignment will be done using the Lab Skills Value Rubric. The actual grade will be determined according to the guidelines outlined in the assignment handout, which will be posted on Blackboard.

The Grading Scale

Your final grade will be determined (on a 100 point scale) as follows:

Final Exam : 40 %

Regular Exams (X4): 30 %

I & A Signature Assignment: 10 %

Lab Skills Signature Assignment: 10%

Lab: 10%

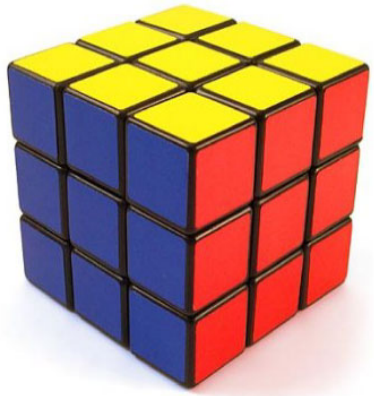
Letter Grades

Composite score	Letter Grade
95 – 100	A
90-94.99	A-
88 – 89.99	B+
83 - 87.99	B
80 - 82.99	B-
78 – 79.99	C+
70 – 77.99	C-
60- 69.99	D
0 – 59.99	F

How I will report your grades:

I will be reporting mid-term and end-semester grades using the +/- system , however, for the rest of the semester, this system will not be used in reporting your grades. ***I reserve the right to adjust class exam scores and final scores (i.e. curving) at my discretion.*** This may or may not happen, but whatever the outcome, it is not negotiable. If you have any controversy with your grades, please bring it to my attention as soon as possible. Waiting weeks or until the very end of the semester will be very unlikely to elicit my sympathy.

Problems and problem solving



I have provided you with answer keys to selected problems in the textbook (that's an understatement, actually, there are a LOT of problems!).

These answer keys are currently posted on Blackboard.

I strongly recommend that you use these problems, as well as in-class examples, problems worked in a group format in class and in review sessions, as your primary study tool.

The list of problems you are responsible for is given on the following page.

A chapter-by-chapter list of recommended problems (solutions are on Blackboard):

Ch. 12: 30, 32, 34, 36, 38, 40, 42, 44, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 82, 86, 88

Ch. 13:
26, 28, 32, 35, 36, 38, 40, 42, 44, 46, 48, 49, 50, 52, 54, 58, 60, 62, 64, 66, 68, 70, 71, 72, 73, 74, 75, 76

Ch. 14:
21, 22, 23, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 40, 42, 44, 47, 48, 53, 54, 56, 57, 58, 60, 64, 66, 68, 70

Ch. 15:
33, 34, 36, 37, 38, 40, 42, 44, 46, 48, 49, 50, 58, 63, 64, 70, 72, 76, 82, 84, 88, 89, 90, 94, 95, 96, 97, 99, 102, 108, 109, 110, 114, 117, 119, 122, 123, 124, 126

Ch. 16:
27, 28, 29, 35, 36, 38, 44, 46, 49, 54, 58, 61, 62, 64, 65, 66, 75, 78, 85, 86, 87, 90, 95, 100, 102, 109, 111, 112

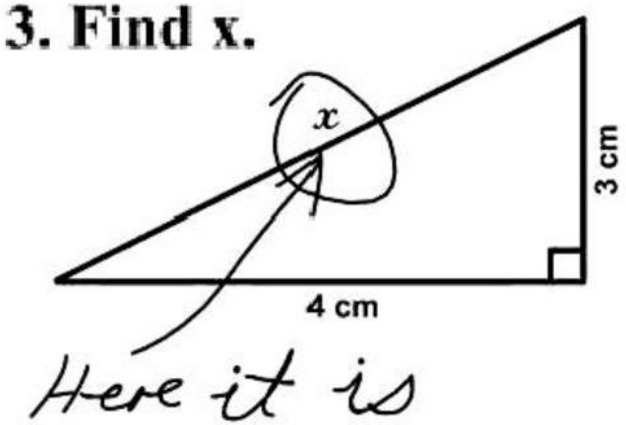
Ch. 17:

31, 32, 33, 34, 35, 38, 48, 50, 52, 58, 60, 63, 64, 66, 70, 76, 78

Ch. 18:

38, 40, 42, 44, 46, 48, 50, 52, 54, 62, 63, 64, 66, 68, 72, 74 (As of this writing, this list is not complete)

Exams are coming!!!



Exams and Exam Formats

All exams will be given during lab time! The exams may consist of multiple choice or short answer questions/problems. When writing your answers or working through any problems, please **WRITE CLEARLY** and **SHOW ALL OF YOUR WORK**. If I can't read it or understand your train of thought, I cannot give you full credit. When writing a numerical answer (answer to a problem), please include the units with the answer (e.g. 3.57 moles, etc), and circle or underline or draw a rectangle around the numerical answer. In other words, make sure that I can readily locate the answer. It is in your best interest to present your work in the neatest, most detailed, and easily understandable way as possible.

Some things you REALLY need to know about the exams:

1. **All exams are potentially comprehensive. This means that, for any given exam, you are responsible for any material that showed up on a previous exam. *THIS INCLUDES MATERIAL FROM THE PREVIOUS SEMESTER*! I was not satisfied with the degree of mastery of material in last semester's syllabus, so you will see it again this semester. In particular, I will focus on material that I feel you really need to understand in order to be prepared for the organic chemistry course. FWIW, I will give you fair and advanced warning what to review from the previous semester for each exam.**
2. **I have several "rules of engagement" for taking exams that I describe on the next several pages. You will read and understand these rules. You will comply with them on your exam. I will enforce them and assess the penalties described.**

Partial credit will be given, but it is NOT negotiable!

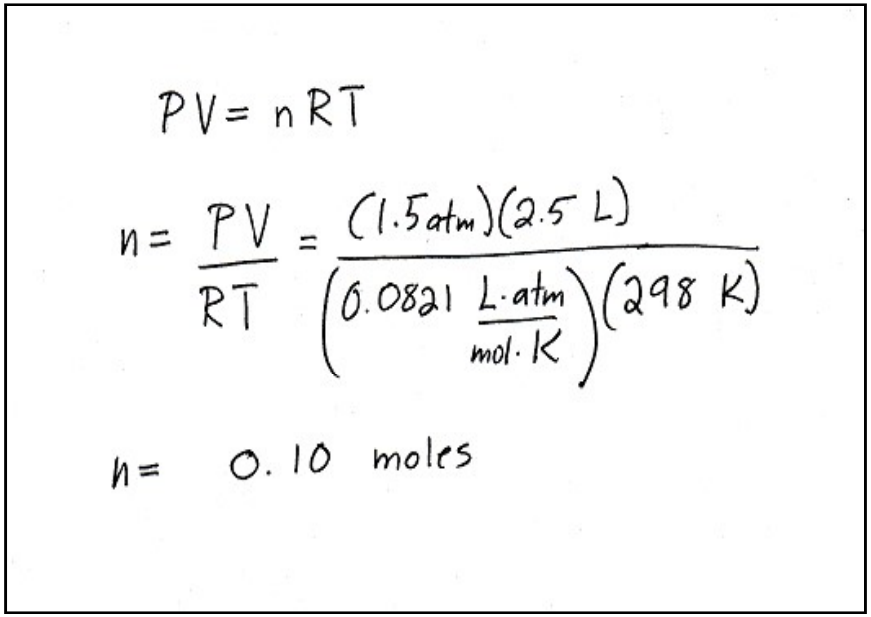
But boss, I just left out a decimal point. Don't I get at least partial credit?

THOMS

Partial credit on numerical problems

a. Subdivided problems: Subdivided problems are problems which have a part a), b), c), etc. I will grade these sections separately from one another. What this means is that, if you make a mistake on one part, I *may* award partial credit for the total point value of *that* part of the problem. So, if a 10 point problem has four parts, each part is worth 2.5 points. If you make a mistake on part a), I may award you partial credit on *that part*. For example, if I award you 90% credit on part a), you will receive 2.25 points. This will not affect the other parts of the problem. ***Therefore, I will not penalize you for any propagated errors.*** If you make a mistake on part a), I will penalize you. However, if you must use the answer to part a) in subsequent parts, I will not penalize you any further, provided that you do not make any more mistakes.

Obvious calculator errors: This happens frequently, because many students spend ridiculous sums of money on very powerful calculators, but are still unable to enter five numbers and get the correct answer. A typical example would be as follows:

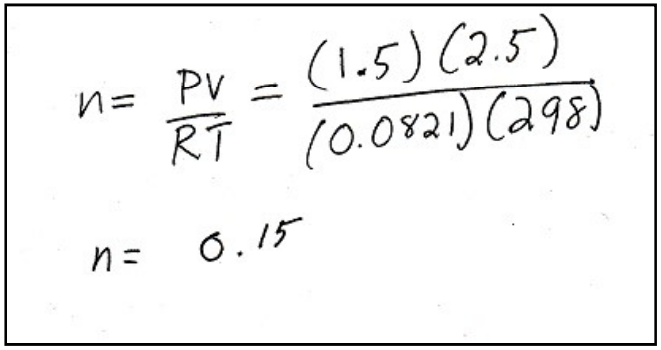


In this case, the problem is set-up correctly, but the final answer is incorrect. This can only be due to the fact that the student failed to enter all the numerical values, failed to carry out the correct order of operations, or both. For mistakes such as this, I will award 90% of the total point value, because the student obviously knew what they were doing, but somehow fumbled on the calculator. **This is why it is always a good idea to show *ALL* of your work explicitly.**

Other errors: The most credit you can receive for an error other than a calculator error is 50% of the total point value. The partial credit you receive will be at my discretion, and ***it is non-negotiable.***

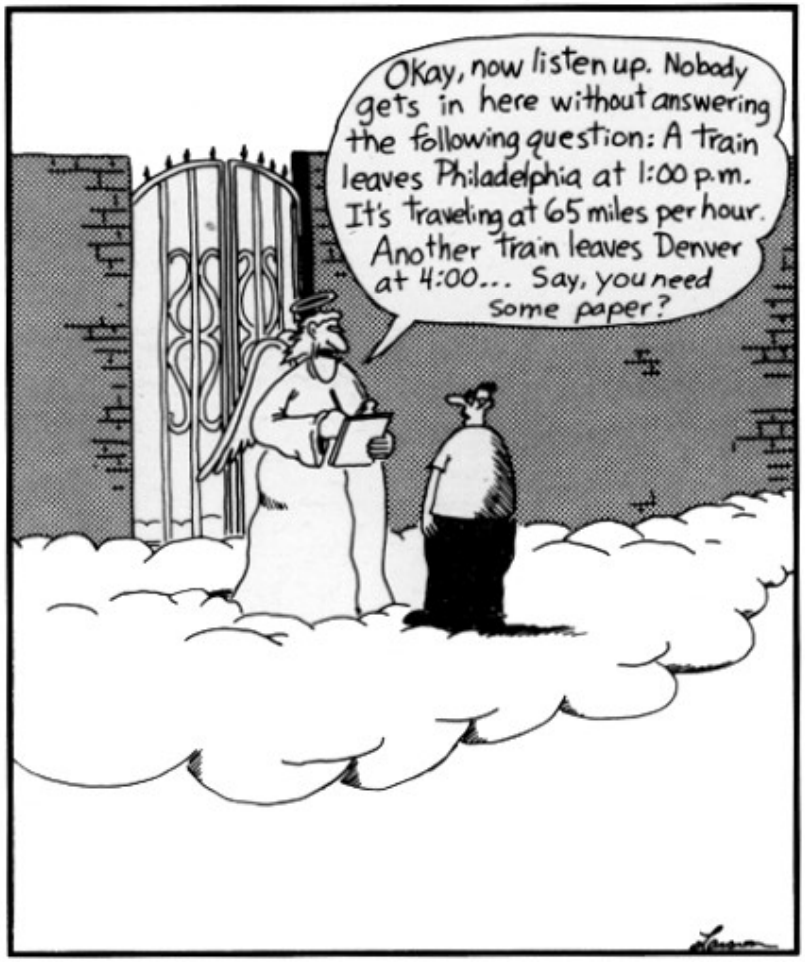
Note: For numerical answers on lab write-up problems, partial credit will not be awarded except in the case of a calculator error.

d. Failing to show your work and/or failing to show the correct units: In the example above, all of the units are shown in the calculation. This is the correct way to show your work on an exam. ***Shown below is the incorrect way:***



This time, the student got the answer right, but did not show the units. **Failing to include the units will result in a penalty of 10% of the total point value for the problem. Failing to show any work at all will result in a separate 10% penalty. This rule holds for lab write-up problems as well.**

This course is *very mathematical* in nature! Make sure that you know how to use your calculators!



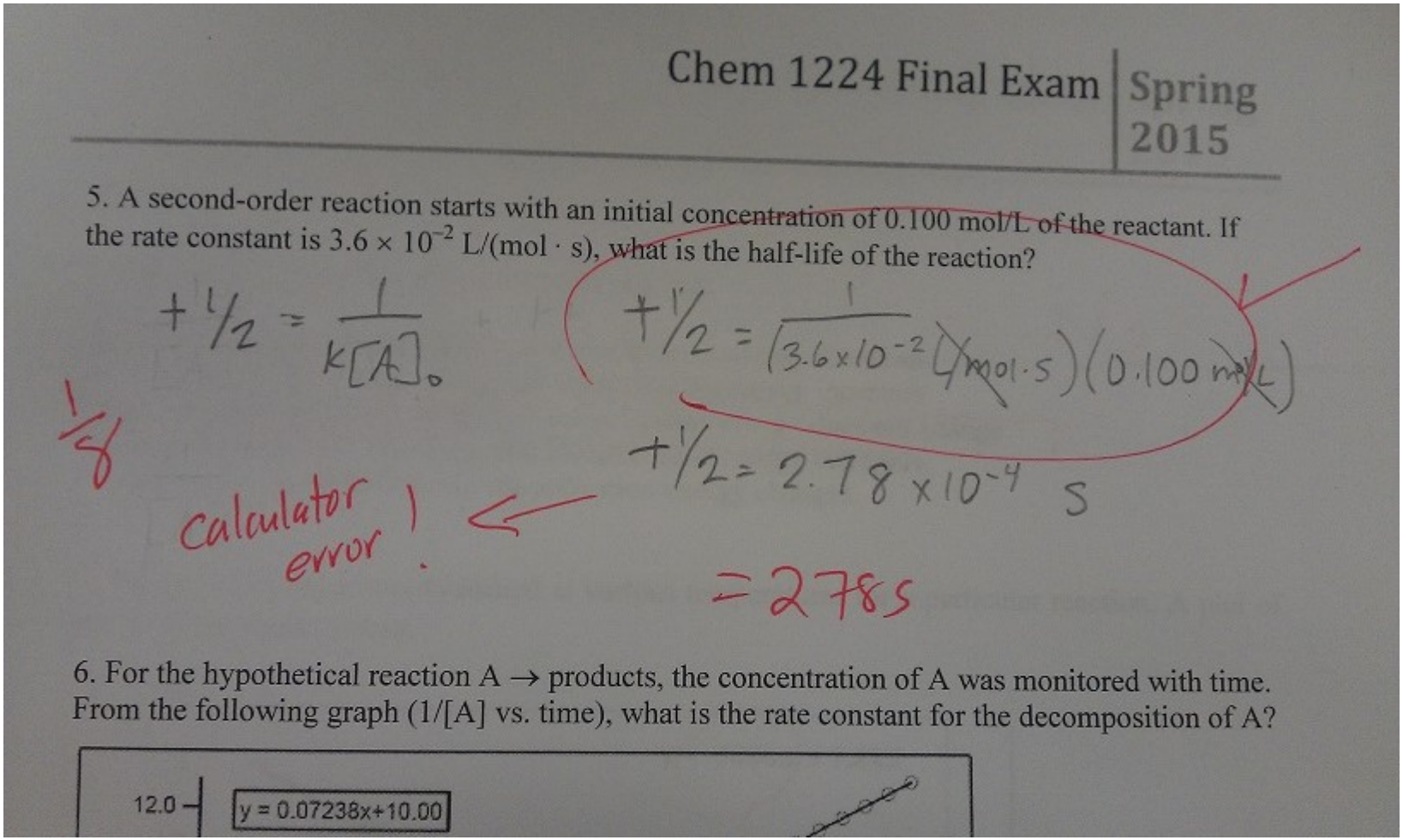
Math phobic's nightmare

The following pages illustrate some problems I encounter every semester:

1. **Students do not know how to use a scientific calculator.**
2. **Students do not try to get an idea of what a reasonable answer may be.**
3. **Students do not double check their calculations**

I want *you* guys to be the ones to break the curse, OK?

Don’t let this be you!



Chem 1224 Final Exam | Spring 2015

5. A second-order reaction starts with an initial concentration of 0.100 mol/L of the reactant. If the rate constant is 3.6×10^{-2} L/(mol · s), what is the half-life of the reaction?

$t_{1/2} = \frac{1}{k[A]_0}$

$t_{1/2} = \frac{1}{(3.6 \times 10^{-2})(0.100)}$

1/8

$t_{1/2} = 2.78 \times 10^{-4}$ s

calculator error! ←

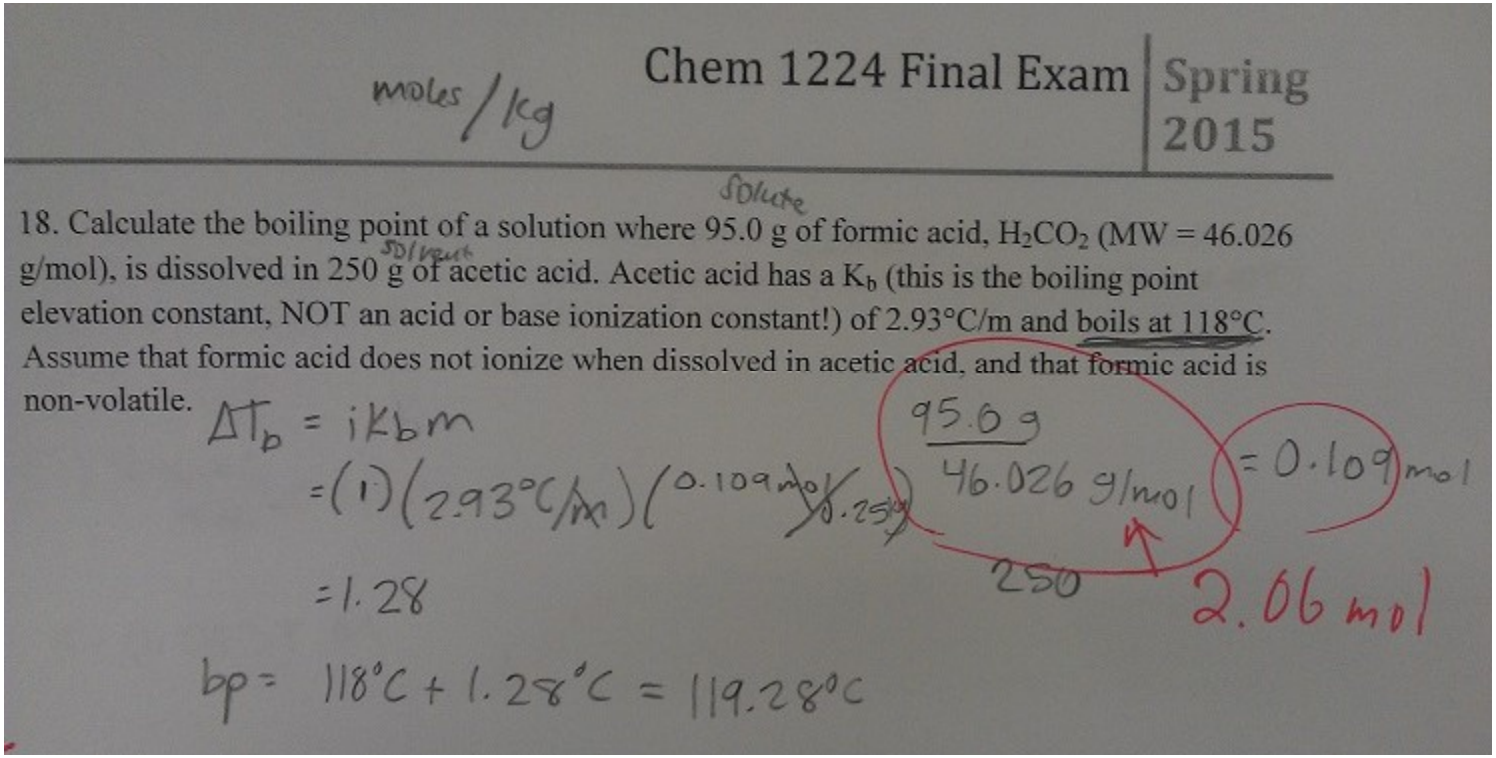
$= 278$ s

6. For the hypothetical reaction A → products, the concentration of A was monitored with time. From the following graph (1/[A] vs. time), what is the rate constant for the decomposition of A?

12.0 y = 0.07238x+10.00

The denominator term will work out to be a number less than one. If you divide a number less than one into one, the result will be greater than one. This person did not double check their work.

When you can figure out a reasonable answer in your head, do so! That way, you can easily check your calculator work.



moles / kg

Chem 1224 Final Exam | Spring 2015

18. Calculate the boiling point of a solution where 95.0 g of formic acid, H_2CO_2 (MW = 46.026 g/mol), is dissolved in 250 g of acetic acid. Acetic acid has a K_b (this is the boiling point elevation constant, NOT an acid or base ionization constant!) of 2.93°C/m and boils at 118°C. Assume that formic acid does not ionize when dissolved in acetic acid, and that formic acid is non-volatile.

$\Delta T_b = iK_b m$

$= (1)(2.93°C/m)(0.109 mol / 0.25 kg)$

$= 1.28$

$bp = 118°C + 1.28°C = 119.28°C$

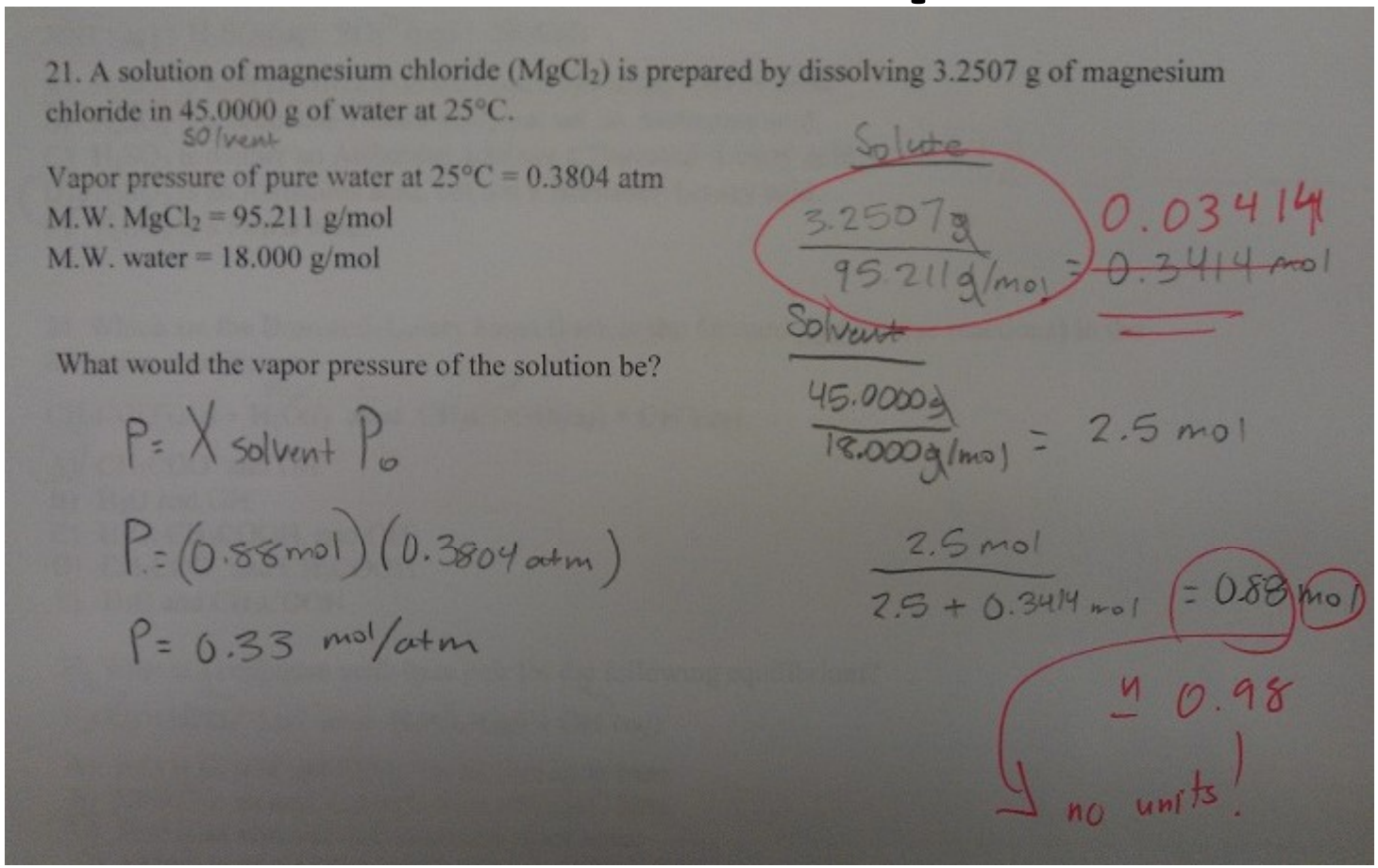
$\frac{95.0\ g}{46.026\ g/mol} = 0.109\ mol$

250

2.06 mol

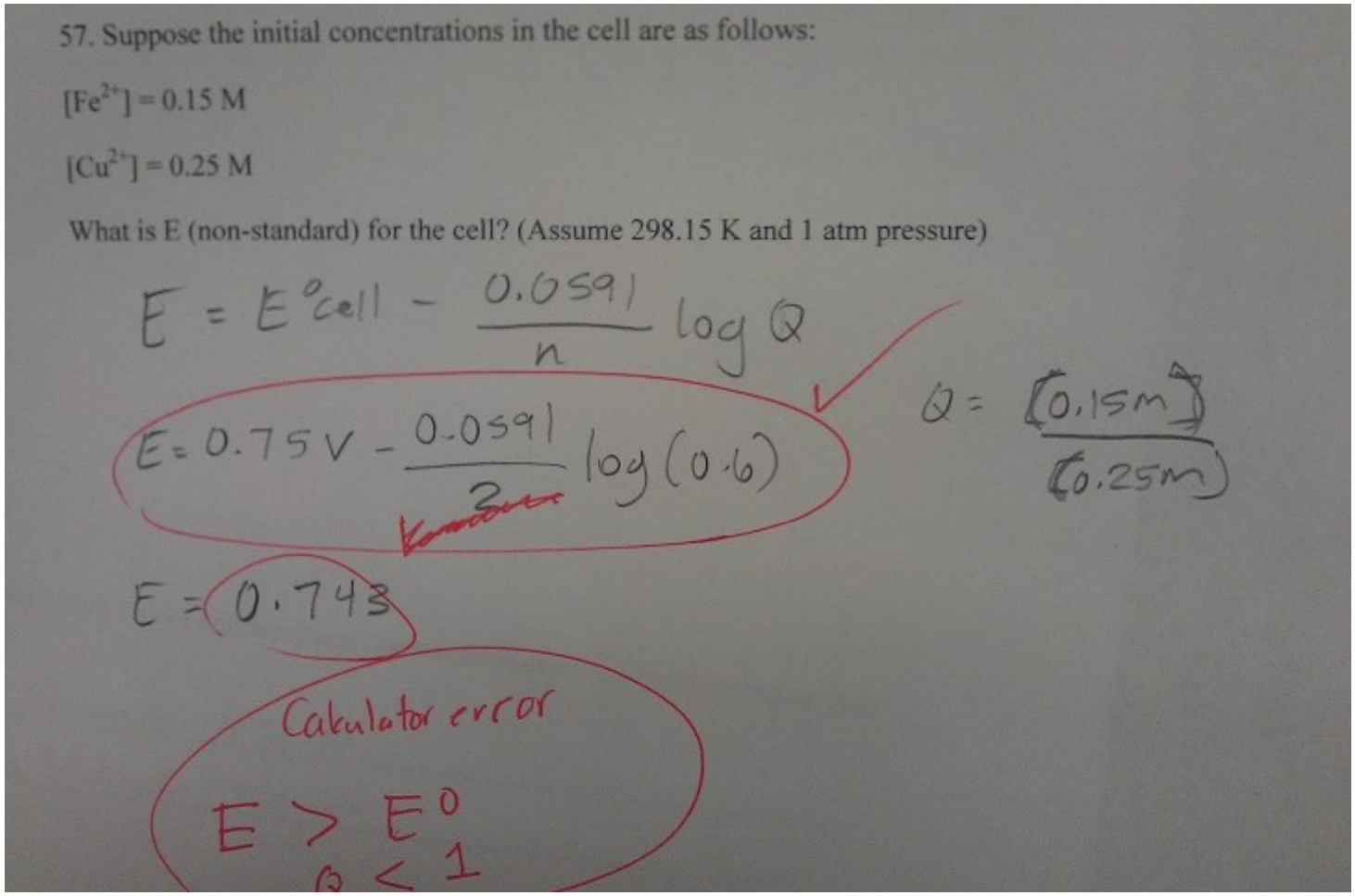
A value of 95.0 divided by 46.026 would be approximately equal to 2, right? Definitely not 0.109. If this person had run the calculation twice, they would probably have caught this mistake.

Twice in the same problem?



In the first mistake, they were off by a factor of ten. In the second mistake, they may or may not have written the number down wrong. I see a lot of people fail to copy numbers down correctly on exams. Always check yourself. You will be amazed at how many silly mistakes you will catch.

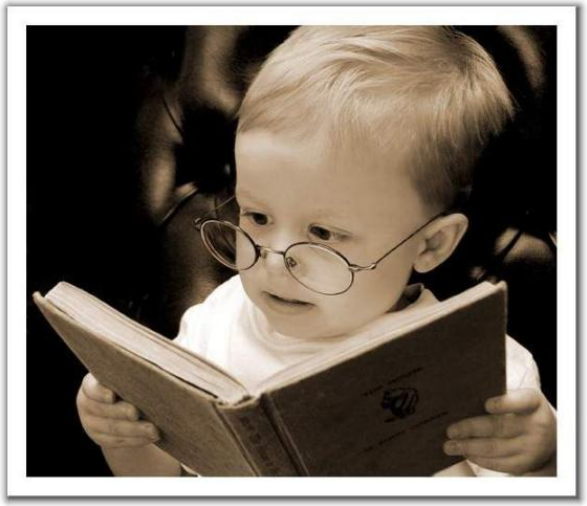
Keep your negative and positive signs straight!



The person should've automatically have known the answer would be > 0.75 volts. Why? The number 0.6 is inside the logarithmic term. The base-10 log of a number less than one is negative. We are subtracting the entire logarithmic term from 0.75, but log(0.6) is negative, and a negative times a negative is a positive, so the answer HAS to be greater than 0.75 volts.

Things to take away from these examples

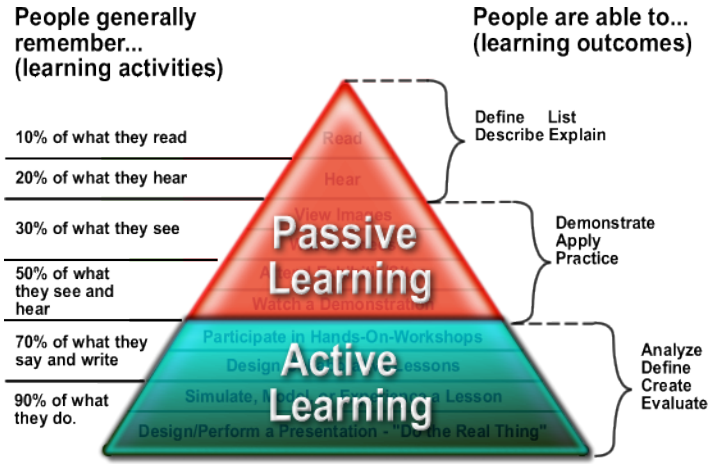
- **All of these mistakes came from *the same person/same exam !***
- **The person actually knew how to do the problems correctly (i.e. the set-up was right!).**
- **All the mistakes that were made were just very silly mistakes that could've been avoided by getting a reasonable idea for the answer, using the calculator correctly, and taking the time to double check the math.**



Preparing for your exams

The best way to learn this material is to do it. Problem solving is THE way to prepare for the exams, period.

If you are struggling, *please see me in my office*, and consider assistance via tutoring at the Academic Success Center. Contact Maretta Garner (garnerm@lindsey.edu) about getting tutoring.



Active learning (especially problem solving) will be the primary study method for this course

You must spend about 3 hours outside of class for every 1 hour you are in class

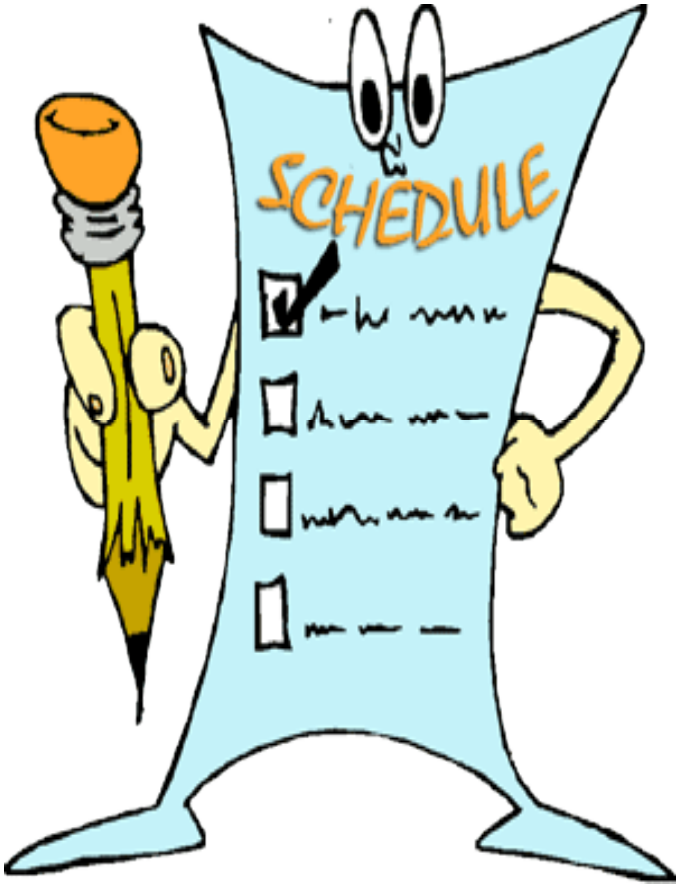
You must work all of the problems in the problem sets and make sure you can obtain the answers given in the solutions

You can benefit greatly from buying the Schaum's Solved Problems Book and working relevant problems from it.

There is no shame in consulting a tutor. In fact, it is recommended.

Come and ask me questions during my office hours. To quote Agent Smith "I'm not such a bad guy…….once you get to know me."

Tentative class/exam schedule: (Note: Stuff happens, so any and all of these dates are subject to change)



Chem 1224 Spring 2016 Tentative Lecture Schedule:

Jan 20, 22, 25, 27, 29, Feb 1	Ch. 12
Feb 3, 5, 8, 10, 12, 15	Ch. 13
Feb 17, 19, 22, 24, 26, 29	Ch. 14
Mar 2, 4, 7, 9, 11, 21	Ch. 15
Mar 21, 23, 28, 30 Apr 1, 4	Ch. 16
Apr 6, 8, 11, 13, 15, 18	Ch. 17
Apr 20, 22, 25, 27, 29	Ch. 18
May 4, 6	TBA

Feb 4 Exam # 1

Feb 25 Exam # 2

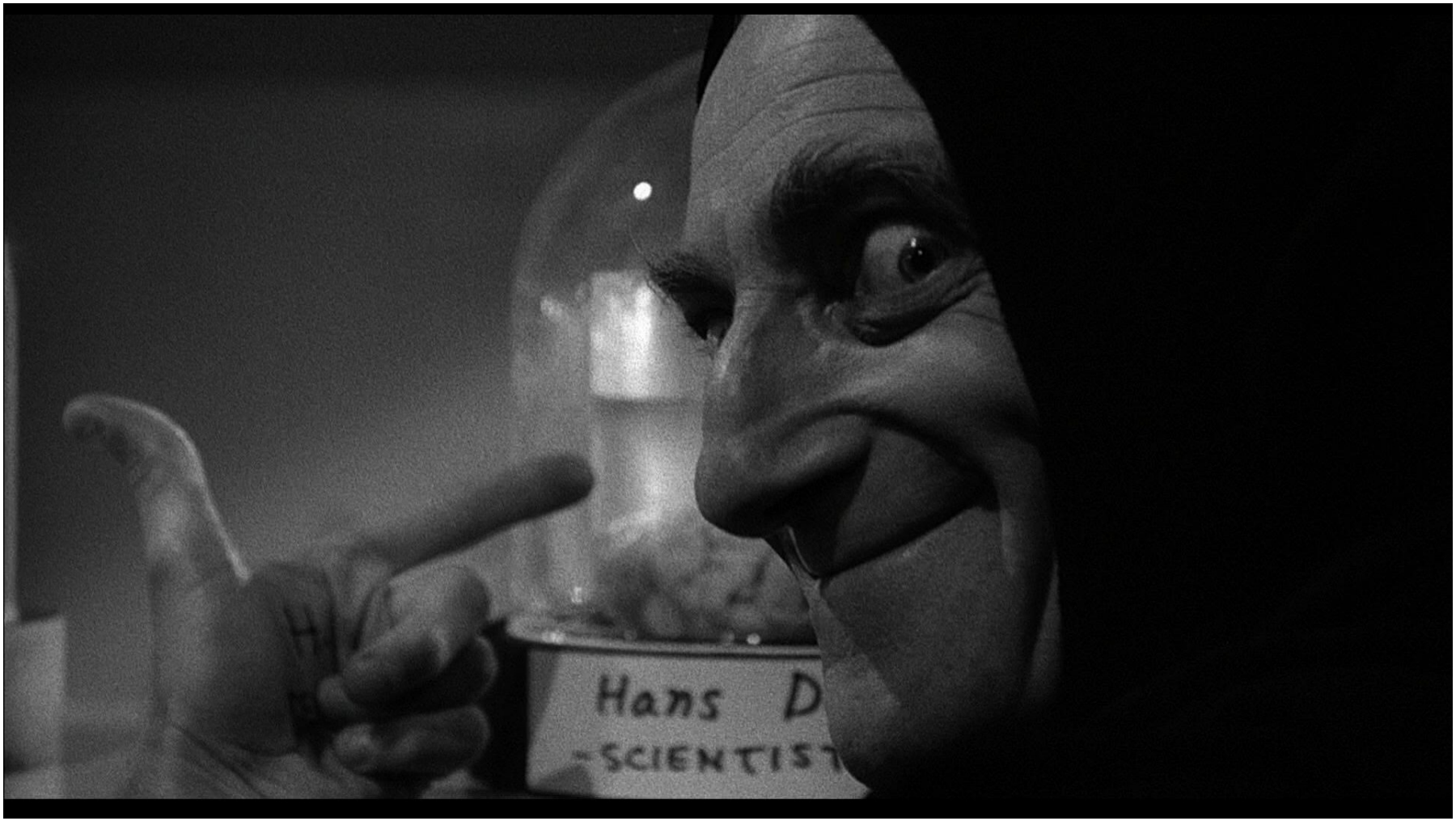
Mar 24 Exam # 3

Apr 7 Exam #4

Apr 28 Exam #5

Final Exam TBA

The Laboratory



Lab Write-Ups

The lab write-up will be divided into the following sections:

Header – In the header, you will include the date, the title of the lab, and your name. You will receive no points for the header, but if you don't let me know who you are, I won't be able to record your grade.
Purpose – In the purpose section, you will briefly describe what you did in the lab. What was the objective of the lab? You also need to briefly discuss the principles behind what you did, including any pertinent equations. When appropriate, you should also make some predictions about what the outcome should have been. In the sample report I have included, the prediction was what effect the addition of potassium nitrate to a solution of KHT might have on the solubility of KHT. **(Continued on the next page)**

Procedure - In this section, you must record what you did in the lab, step-by-step. A procedure should be written well enough so that someone else, without a lab manual, could read your procedure and be able to do the experiment, reproducing your results.

Data – In this section, you will record *all* observations and measurements that you make. For any numerical data that you record, be sure to include the correct units. The number 5 really doesn't mean anything. However, 5 grams or 5 ml does mean something, because there are units to tell you what the number is a measure of.

Questions and Calculations – In this section, you will show all required calculations, step-by-step. When writing down calculations, make sure to include units in your answer. Also make sure I can find the answer and know what it is.

You will also answer any questions that the lab manual asks. Be sure that I can find your answers.

In this section, you should also make some commentary about your results. In the sample report I have included, I commented on the fact that addition of potassium nitrate did decrease the solubility of KHT, as expected. I also explained why the K_{sp} value changed when, theoretically, it shouldn't have. If you get bad results, you should try to explain what went wrong.

Some Guidelines for Lab Write-Ups

Clarity is all important. Be sure to write as neatly as you can.

Be sure to organize information in such a way that I can easily tell what it is that I am looking at. In particular, record your data as neatly as possible. Use little headers or titles so that it is obvious what the data is.

Be sure to clearly label each section of the write-up

Never write in first person.

Always include a hard copy of any graphs, etc. that may be required.

When doing your calculations, do them in sufficient detail that I can follow what you did and identify any mistakes you made.

Always write in ink. **NO PENCIL!**

Sample lab write-up

Note: I realize this might be difficult to read. I have also included it as a separate file in the "Lab" folder on Blackboard.

7/26/2012 Solubility Product of KHT

Bartholomew Fatheringay Parsloe-Parsloe

Purpose

The purpose of this laboratory exercise will be, in Part 1, to determine the solubility product constant, Ksp, of the salt potassium hydrogen phthalate, KHT. In Part 2, the effect of adding the common ion, K^+, on the solubility of KHT will be investigated.

KHT dissolves in water according to the equation:

$$KHT(s) \rightleftharpoons K^+(aq) + HT^-(aq)$$

Ksp for this process is therefore:

$$Ksp = [K^+][HT^-]$$

In the absence of any common ions, the solubility of KHT is:

$$s = [K^+] = [HT^-]$$

Upon addition of K^+ in the form of potassium nitrate, KNO_3, the solubility is:

$$s = [HT^-]$$

The concentration of the phthalate ion, HT^-, will be determined by titration w/ standardized sodium hydroxide, NaOH, since HT^- is a weak acid. In part 1, $[HT^-] = [K^+]$, so that:

$$Ksp = [HT^-]^2$$

In part 2, $[K^+]_{total} = [KNO_3] + [HT^-]$, so:

$$Ksp = [HT^-]([KNO_3][HT^-])$$

In ~~part~~ part 2, Ksp should be the same, but [HT-], and therefore the solubility of KHT, should be lower due to the presence of extra K^+.

Procedure

Standardization of NaOH w/ 0.1 M H_2SO_4

1. Fill a 50 mL burette w/ 0.1 M H_2SO_4 and deliver approximately 10 mL of the acid into a 150 mL beaker. Add 3-4 drops of phenolphthalein to the acid and swirl the contents. Record the initial volume and final volume of the acid.
2. Fill a second 50 mL burette w/ NaOH. Record the initial volume of NaOH.
3. Titrate the acid w/ NaOH to an endpoint. Record the final volume of NaOH.
4. Dilute the NaOH 1:2.

Preparation of saturated KHT solutions in water and 0.5 M KNO_3.

1. Weigh out 0.7 gram powdered KHT into a 250mL Erlenmyer flask. Add 100 mL of deionized water and a magnetic stir bar. Stir for at least 20 minutes.
2. Repeat step 1, but make the KHT solution in 100mL of 0.5 M KNO_3 instead of just water.
3. Filter both solutions into fresh 250 mL Erlenmyer flasks.

KHT Titrations

1. Perform 3 trials for each KHT solution.

2. Using a burette, deliver about 10-12 mL of KHT or KHT/KNO_3 into a new 250 mL Erlenmyer flask. Add 100 mL of deionized water and 3-4 drops of phenolphthalein solutions.

3. Titrate the KHT or KHT/KNO_3 w/ the standardized NaOH to an endpoint.

Data

Standardization of NaOH ($[H_2SO_4] = 0.1\ M$)

1. Addition of H_2SO_4 to 150 mL beaker

   $V_{initial} = 14.85\ mL$ $V_{final} = 24.35\ mL$

   $V_{H_2SO_4\ added} = 24.35\ mL - 14.85\ mL = 9.5\ mL$

2. Titration w/ NaOH

   $V_{NaOH\ initial} = 4.35\ mL$ $V_{NaOH\ final} = 25.10\ mL$

   $V_{NaOH\ to\ reach\ endpoint} = 25.10\ mL - 4.35\ mL$
   $= 20.75\ mL$

* Dilute NaOH solution 1:2

Titration of KHT (No KNO_3)

Trial # 1

Volume KHT added: $V_i = 2.4\ mL$ $V_f = 14.25\ mL$

$V_{tot} = 14.25\ mL - 2.4\ mL = \cancel{12.01\ mL}$
$= 11.85\ mL$

Volume NaOH: $V_i = 1.6\ mL$ $V_f = 9.55\ mL$

$V_{tot} = 9.55\ mL - 1.6\ mL = 7.95\ mL$

Trial # 2

Volume KHT added: $V_i = 14.25\ mL$ $V_f = 24.25\ mL$
$V_{tot} = 24.25\ mL - 14.25\ mL = 10.00\ mL$

Volume NaOH: $V_i = 10.00\ mL$ $V_f = 16.80\ mL$
$V_{tot} = 16.80\ mL - 10.00\ mL = 6.80\ mL$

Trial # 3

Volume KHT added: $V_i = 24.25\ mL$ $V_f = 34.20\ mL$
$V_{tot} = 34.20\ mL - 24.25\ mL = 9.95\ mL$

Volume NaOH: $V_i = 16.80\ mL$ $V_f = 23.50\ mL$
$V_{tot} = 23.50\ mL - 16.80\ mL = 6.70\ mL$

Titration of KHT + 0.5 m KNO_3

Trial #1

Volume KHT/KNO_3: $V_i = 0.75\ mL$ $V_f = 20.50\ mL$
$V_{tot} = 19.75\ mL$

Volume NaOH: $V_i = 0.50\ mL$ $V_f = 2.45\ mL$
$V_{tot} = 1.95\ mL$

Trial # 2

Volume KHT/KNO_3: V_i = 19.75 mL V_f = 40.30 mL
V_{tot} = 20.55 mL

Volume NaOH: V_i = 2.45 mL V_f = 4.65 mL
V_{tot} = 2.20 mL

Trial # 3

Volume KHT/KNO_3: V_i = 17.55 mL V_f = 42.95 mL
V_{tot} = 25.40 mL

Volume NaOH: V_i = 4.65 mL V_f = 7.30 mL
V_{tot} = 2.65 mL

Questions & Calculations

Standardization of NaOH

moles H_2SO_4 in beaker = $0.0095\ L \times \frac{0.1\ \text{moles}}{L}$

$= 0.00095$ moles H_2SO_4

moles NaOH needed to reach end point = 0.00095 moles $H_2SO_4 \times \frac{2\ \text{mol NaOH}}{1\ \text{mol } H_2SO_4}$

$= 0.0019$ moles NaOH

$[NaOH] = \frac{0.0019\ \text{moles NaOH}}{0.02075\ L} = 0.092\ m$

NaOH was diluted 1:2, so the [NaOH] used in the KHT titrations was:

$[NaOH] = \frac{0.092\ m}{2} = 0.046\ m$

Titration of KHT w/ no KNO_3

Trial #1 # moles NaOH = $0.00795\ L \times 0.046\ \frac{moles}{L}$

$= 0.000345$ moles

moles HT^- = # moles NaOH = 0.000345 moles

$[HT^-] = \frac{0.000345\ moles}{0.01185\ L} = 0.029\ M$

$K_{sp} = [HT^-]^2 = (0.029)^2 = 0.00085$

Trial #2 # moles NaOH = $0.00680\ L \times 0.046\ \frac{moles}{L}$

$= 0.00031$ moles

moles HT^- = 0.00031 moles

$[HT^-] = \frac{0.00031\ moles}{0.01000\ L} = 0.031\ M$

$K_{sp} = [HT^-]^2 = (0.031)^2 = 0.00098$

Trial #3 # moles NaOH = $0.00670\ L \times 0.046\ \frac{moles}{L}$

$= 0.0003082$ moles

moles HT^- = 0.0003082 moles

$[HT^-] = \frac{0.0003082\ moles}{0.00995\ L} = 0.031\ M$

$K_{sp} = [HT^-]^2 = (0.031)^2 = \cancel{0.0098}\ 0.00098$

Average $K_{sp} = \frac{0.00085 + 0.00098 + 0.00098}{3}$

Average $K_{sp} = 0.00094$

Titration of KHT w/ 0.5 m KNO_3

Trial #1 # moles NaOH = $0.00195\ L \times 0.046 \frac{moles}{L}$

$= 8.97 \times 10^{-5}$ moles

= # moles HT^-

$[HT^-] = \frac{8.97 \times 10^{-5}\ moles}{0.01975\ L} = 4.5 \times 10^{-3}\ M$

$[K^+] = [KNO_3] + [HT^-] = 0.5\ m + 4.5 \times 10^{-3} M$

$= 0.5045\ m$

$K_{sp} = (0.5045)(4.5 \times 10^{-3}) = 2.3 \times 10^{-3}$

Trial #2 # moles NaOH = $0.00220\ L \times 0.046 \frac{moles}{L}$

$= 1.01 \times 10^{-4}$ moles

= # moles HT^-

$[HT^-] = \frac{1.01 \times 10^{-4}\ moles}{0.02055\ L} = 4.9 \times 10^{-3} M$

$[K^+] = 0.5M + 4.9 \times 10^{-3} M = 0.5049 M$

$K_{sp} = (0.5049)(4.9 \times 10^{-3}) = 2.5 \times 10^{-3}$

Trial #3 # moles NaOH = $0.00265\ L \times 0.046 \frac{moles}{L}$

$= 1.22 \times 10^{-4}$ moles

= # moles HT^-

$[HT^-] = \frac{1.22 \times 10^{-4}\ moles}{0.02540\ L} = 4.8 \times 10^{-3} M$

$[K^+] = 0.5m + 4.8 \times 10^{-3}\ m = 0.5048m$

$K_{sp} = (0.5048)(4.8 \times 10^{-3}) = 2.4 \times 10^{-3}$

$$\text{Average } K_{sp} = \frac{2.3 \times 10^{-3} + 2.5 \times 10^{-3} + 2.4 \times 10^{-3}}{3}$$

$$= 2.4 \times 10^{-3}$$

As expected, the addition of the common ion K^+ drastically reduced the solubility of KHT. However, the K_{sp} changed upon addition of KNO_3. This should not have occured, since K_{sp} is a constant. However, it turns out that nitrate, NO_3^-, is known to increase the solubility of KHT, so that, even though the solubility still decreased, the K_{sp} actually increased.

Score	4	3	2	1	0
Purpose	Purpose is clearly stated. All theory and background is well developed and supported with equations. No spelling or grammar errors	Purpose is stated, but discussion/development of background and theory was poorly done.	Purpose was stated, but little to no theory or background was included. Alternatively, student failed to elucidate the true purpose of the lab	Student more or less plagiarized this section from the lab manual or other reference materials.	Section was not completed
Procedure	Procedure was very clearly written, easy to follow, with no omissions. Another person could easily do this lab based on the procedure given here.	Procedure was clearly written, but would be difficult to follow in some instances.	Procedure was given, but contains many ambiguities and omissions, which would be very difficult to follow.	Procedure is very poorly written and organized, and it would be nearly impossible to replicate the experiment based on the procedure given.	No procedure was given.
Data	All data was clearly presented, with hard copies of plots, etc. where needed. Data was very organized, easy to interpret, and all units were included.	All data was clearly presented, with hard copies of plots, etc. where needed. Data was very organized, easy to interpret. Some units were missing.	Not all data was clearly presented. Some data, especially graphical plots were missing. What was given was reasonably organized.	Numerous data were missing OR, alternatively, the presentation was very poorly organized, making it very difficult to find.	No data given
Questions/Calculations	All questions and calculations were answered correctly . Numerical problems were easy to follow with correct units given.	One question/calculation was answered correctly. Numerical problems were easy to follow with correct units given. OR, all were answered correctly, but with some omission of units.	More than one question/calculation was answered incorrectly answered, OR answers were very difficult to follow, OR numerous omissions of units occurred, OR some combination of these.	Questions/calculations contained numerous mistakes, with almost no correct answers.	Section was not completed
Format	Format was followed exactly, and was very easy to follow.	Format was almost followed. A few items were out of order.	Format was followed, but difficult to read due to poor handwriting and/or poor writing style	Format not followed well. Very difficult to read.	No format at all, and/OR write-up was completely illegible.

Scoring of Lab Write-ups:

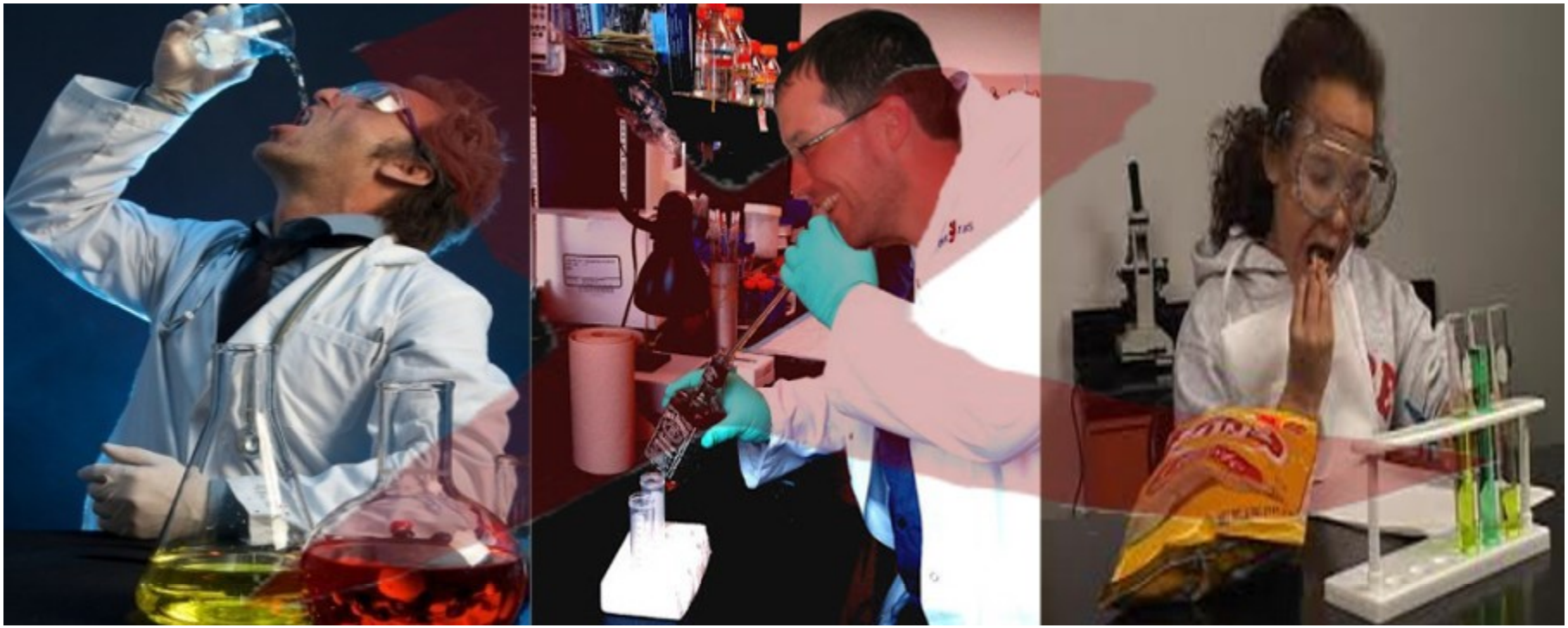
Lab write-ups are 20 pts each, the score for which will be obtained from the rubric given on the previous page.

Lab write-up scores will be converted to percentages (i.e. a perfect 20 point report is 100%) when used to determine your overall course grade.

Due Dates For Lab Write-ups

Write-ups will be due at the end of the day, one week from the day you did the lab.

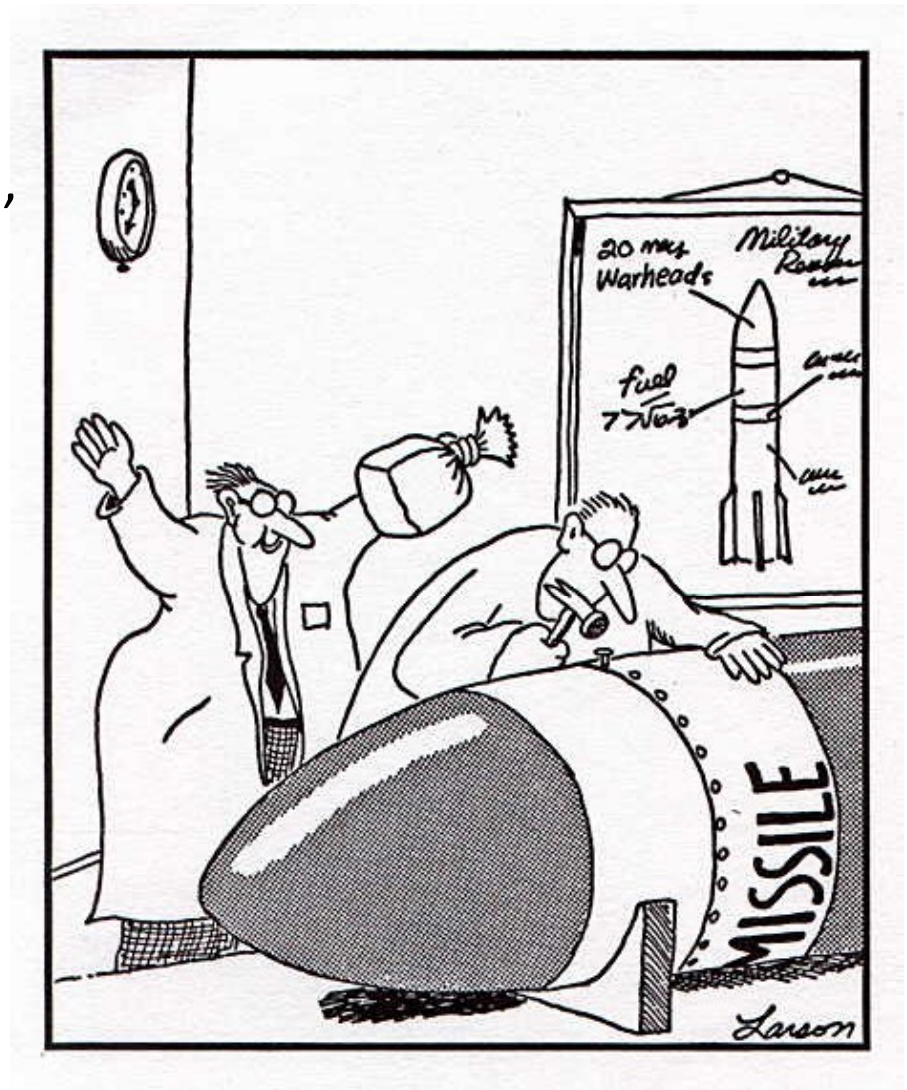
Exception: If we are having an exam, the previous week's write-up will be due the next lab period after the exam (i.e. you get two weeks for those).



Safety in the Laboratory

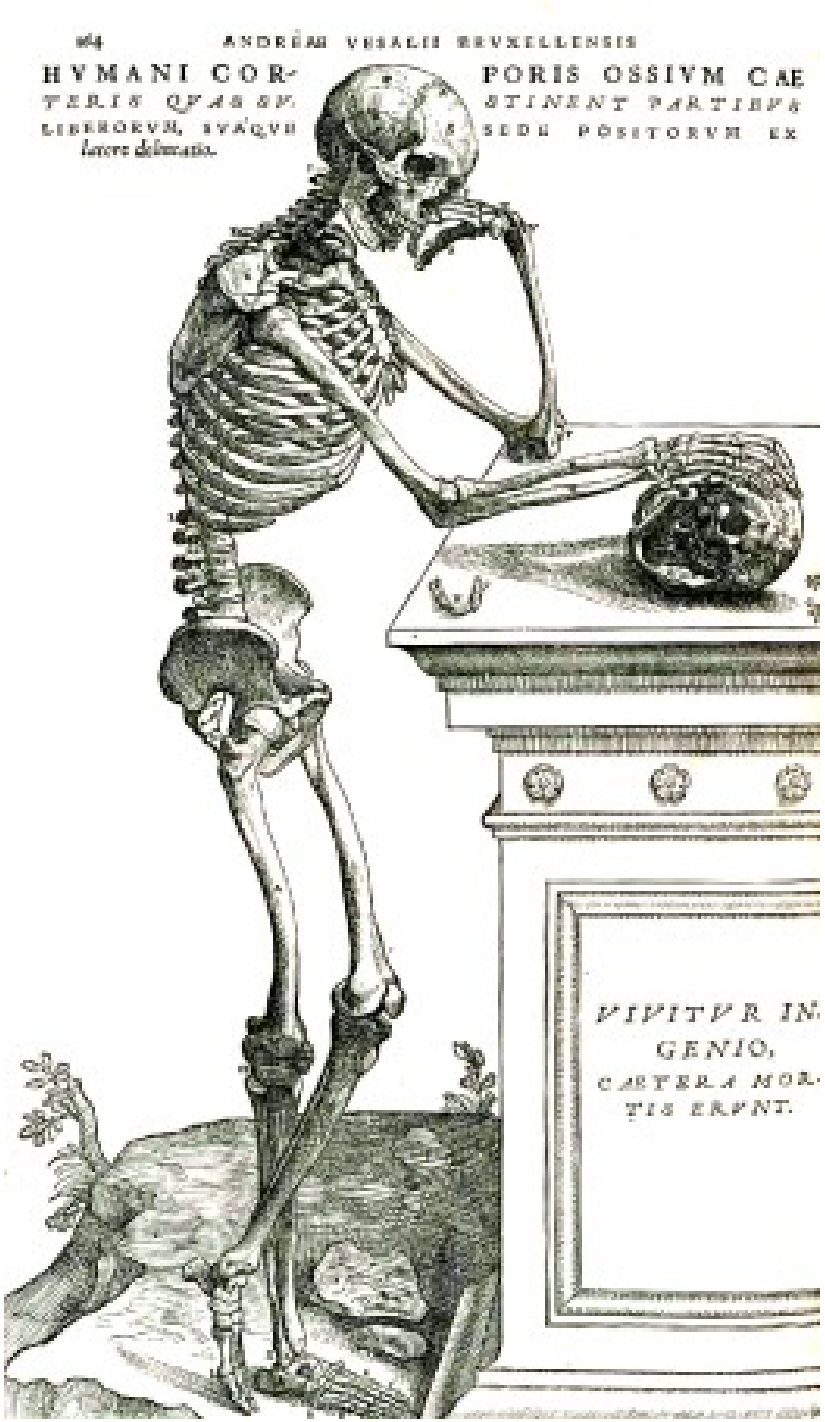
The Rules:

1. Wear safety goggles at all times
2. No open-toed shoes (flip-flops, sandals, etc.)
3. You MUST wear socks!
4. No shorts
5. No skirts
6. No halter tops (crop-tops)
7. No sleeveless shirts
8. No contact lenses (glasses only)
9. Long hair must be tied back
10. Don't put on make-up in the lab
11. Always ask me about waste disposal
12. Don't leave an analytical balance dirty
13. Don't leave any containers open
14. No eating or drinking
15. No horseplay
16. Don't be late for lab.



Penalties for breaking the rules

1. Breaking any one of the rules will result in a 10 point deduction (one letter grade) *per violation* from your write-up.
2. Exceptions: If ***anyone*** violates rules 12 OR 13, the ***entire section*** loses ten points from their write-ups.
3. If it becomes clear that you are consistently reckless, unsafe, and/or disruptive in the lab, I will have no choice but to go to Academic Affairs.



Tentative Lab Schedule:

Jan 28: Ideal Gas Laws

Feb 11: Heat of Reaction

Feb 18: Determination of a Rate Law

Mar 3: Determination of an Equilibrium Constant

Mar 24: pH Titration

Mar 31: Determination of a solubility product constant

Apr 14: Redox titration

Apr 21: Lab Skills Assessment

Make-up Exam Policies

You may make up an exam *with my permission* 1-3 days *before* the scheduled exam. My decision whether or not to allow this will not be influenced by any excuses. It is *solely at my discretion*, and it is *not negotiable*.

You may also make up an exam 1-3 days *after* the scheduled exam (once again, at my sole discretion, which will not be influenced by excuses). This exam will be an alternative exam, and I strongly recommend against you pursuing this route, because the alternative exam might be very unpleasant.

Outside of this time frame, I will not allow a make-up exam.

Exceptions to the Exam Make-up Policies:

If you are an athlete who has to be away, you may take any one of the options mentioned on the previous page. If you wish to take the exam after the scheduled date, but you will have to be away longer than the 1-3 day time slot, I will be willing to extend it so that you can take it late.

Lab Make-up Policy:

Labs will be made up with my permission, and NO excuses will be considered. It will be solely at my discretion.

Some things that can get you into trouble

- **Failure to attend class/chronic tardiness**
- **Texting/use of cell phone during class**
- **Talking during class to the extent that I have to bring it to the attention of the entire class**
- **Doing any work/studying during class that has nothing to do with this class**
- **Insubordination**

Consequences:

I will basically be an ice-pick in your advisor's (and/or coach's) ear as long as the behavior persists

If the behavior continues long enough, at my discretion, I will take you to Academic Affairs

I reserve the right to allow absenteeism, cell phone texting, disruptive behavior, insubordination, or any other behavior that I deem to be a problem affect your final grade for the course.

Jan 26: Last day to register or add a day class

Mar 14 – 18: Spring Break

Apr 25: Good Friday (no class)

May 6: Last day of classes

Some Disclaimers

Any and all dates mentioned in this syllabus are subject to change!

If I suspect foul play, I will verify doctor's excuses and any other excuses by calling the office in question to confirm it.

LINDSEY WILSON COLLEGE STATEMENTS FOR INCLUSION IN THE SYLLABUS 2015-2016

LINDSEY WILSON COLLEGE
STATEMENTS FOR INCLUSION IN THE SYLLABUS
2015-2016

Academic Integrity

Academic integrity is essential to the existence of an academic community. Every student is responsible for fostering a culture of academic honesty, and for maintaining the integrity and academic reputation of Lindsey Wilson College. Maintaining a culture that supports learning and growth requires that each student make a commitment to the fundamental academic values: honesty, integrity, responsibility, trust, respect for self and others, fairness and justice.

To foster commitment to academic integrity, faculty are asked to require each student to place and sign the following Honor Code on tests, exams and other assignments as appropriate: **On my honor as a student, I have neither given nor received any unauthorized aid on this assignment/exam.**

Violations of the academic integrity policy include cheating, plagiarism or lying about academic matters. Plagiarism is defined as any use of another writer's words, concepts, or sequence of ideas without acknowledging that writer by the use of proper documentation. Not only the direct quotation of another writer's words, but also any paraphrase or summary of another writer's concepts or ideas without documentation is plagiarizing that writer's materials. Academic dishonesty is a profoundly serious offense because it involved an act of fraud that jeopardizes genuine efforts by faculty and students to teach and learn together. It is not tolerated at Lindsey Wilson College.

Students who are determined to have plagiarized an assignment or otherwise cheated in their academic work or examinations may expect an "F" for the activity in question or an "F" for the course, at the discretion of the instructor. All incidents of cheating or plagiarism are reported by the instructor to the Academic Affairs Office along with copies of all relevant materials. Each instance of cheating or plagiarism is counted separately. A student who cheats or plagiarizes in two assignments or tests during the same semester will be deemed guilty of two offenses. If the evidence is unclear, or if a second offense occurs, the VP for Academic Affairs or Associate Dean will work in cooperation with the Dean of Students to move the student before the campus Judicial Board for review. Violations will ordinarily result in disciplinary suspension or expulsion from the College, depending on the severity of the violation involved. **Note:** The College encourages the use of Safe Assign to detect plagiarized documents.

Questioning a Grade -- The Student Academic Complaint Policy

A student, who wishes to question **an assignment grade, or other academic issue**, should follow the procedure below:

1. Whenever possible, the student will first go to the faculty member who has assigned the disputed grade. Complaints regarding grades should be made within seven (7) days of receipt of the disputed grade and, if possible, will be decided by the faculty member within seven (7) days of receipt. If the disputed grade is the final grade for the course, "receipt" is defined by when the final grade is posted online by the registrar. (Please refer to the next section for appealing a final grade.)
2. Unless there are extenuating circumstances, the student may, within seven (7) days request in writing a review of such decision by the Chair of the division in which the grade was assigned. Upon receipt of such request, that Chair will direct the faculty member and the student to each submit, within seven (7) days, if possible, a written account of the incident, providing specific information as to the nature of the dispute.
3. Upon receipt of these written accounts, the Chair will meet, if possible, within seven (7) days with the faculty member and the student in an effort to resolve the dispute and will render his or her decision in writing.
4. If either the student or the faculty member desires to appeal the decision of the Division Chair, the student or faculty member may, within seven (7) days by written request to the chair, ask that the matter be reviewed by a Grade Appeals Panel convened by the Academic Affairs Office.
5. If the disputed grade is assigned at the end of a fall or spring semester and the student and faculty member cannot meet to resolve the issue, the student should contact the faculty member by e-mail within seven (7) days of receipt of the disputed grade. If the issue cannot be resolved by e-mail within the time limit, steps 2, 3 and 4 of the appeal may extend into the beginning of the semester immediately following receipt of the disputed grade by following the timeline above.

A student who wishes to question a **final grade** should follow the procedure below:

1. Confer with the faculty member who assigned the disputed grade.
2. If the disputed grade cannot be resolved, a written request for a grade appeal must be submitted to the Academic Affairs Office before the first day of the semester following the one in which the grade was issued. The written request must include the specific basis for the appeal.
3. The Academic Affairs Office will convene a Grade Appeals Panel, comprised of the Vice President for Academic Affairs, the Associate Academic Dean, and the chair of the academic unit which houses the course for which the grade is appealed. If one of the members is the faculty member who issued the grade, an alternate will be appointed. The student and the faculty member may appear separately before the panel to explain their positions. The hearing is non-adversarial. Neither the faculty member nor the student may be accompanied by other individuals to the meeting of the Grade Appeals Panel. The Grade Appeals Panel will notify the student of its decision, if possible, within seven (7) days of the meeting.

Policy for Verification of Student Identity and Protection of Privacy

In compliance with United States Federal Higher Education Opportunity Act (HEOA), Public Law 110-315, all credit-bearing courses and programs offered through distance learning methods must verify that the student who registers for a distance education course or program is the same student who participates in and completes the course or program and receives academic credit. One or more of the following methods must be used:

a) A secure login and pass code;
b) Proctored examinations; and/or
c) Remote proctoring of one of more examinations using Tegrity or other technologies

Verification of student identity in distance learning must protect the privacy of student information. Personally identifiable information collected by the College may be used, at the discretion of the institution, as the basis for identity verification. For instance, a student requesting that their learning system password be reset may be asked to provide two or more pieces of information for comparison with data on file. It is a violation of College policy for a student to give his or her password to another student.

Detailed information on privacy may be located at: http://www.lindsey.edu/media/319883/Online%20Services%20Privacy%20Policy%204.20.12.pdf

Institutional Review Board (IRB) Policies

The Lindsey Wilson College Institutional Review Board (IRB) safeguards the rights and welfare of human participants in research and other research activities. Lindsey Wilson College faculty, staff, and students, which comprise its academic unites, and facilities, are subject to the IRB policies. This includes any research for which a research agreement (e.g. MOU) identifies Lindsey Wilson College Institutional Review Board (IRB) as the IRB of record. All student-led human subject research mush have a LWC faculty sponsor. All faculty members and students conducting human subject research are required to submit documentation of training on research involving human subjects that has been completed within two years of the onset of the proposed research. Online training is available at http://php.nihtraining.com/users/login.php.

Statement on Learning/Physical Disabilities

Lindsey Wilson College accepts students with learning disabilities and provides reasonable accommodation to help them be successful. Depending on the nature of the disability, some students may need to take a lighter course load and may need more than four years to graduate. Students needing accommodation should apply as early as possible, usually before May 15. Immediately after acceptance, students need to identify and document the nature of their disabilities. It is the responsibility of the student to provide to the College appropriate materials documenting the learning disability, usually a recent high school Individualized Education Program (IEP) and results from testing done by a psychologist, psychiatrist, or qualified, licensed person. The College does not provide assessment services for students who may be learning disabled. Although LWC provides limited personal counseling for all students, the College does not have structured programs available for students with emotional or behavioral disabilities. For more information, call Ben Martin at 270-384-7479.

Academic Success Center

The Academic Success Center, located in the Everett Building, offers peer tutoring to aid students in completing class assignments, preparing for exams and improving their understanding of content covered in a particular course. In addition, computers are available for student use.

Students are encouraged to utilize this Center as a resource for improving study strategies and reading techniques. The Center also offers assistance with other academic problems resulting from documented learning disabilities. All services are free of charge to all Lindsey Wilson College students (students with learning disabilities are responsible for providing documentation from an appropriate outside professional source such as a professional evaluation or school IEP). Please contact Maretta Garner, Tutor Coordinator at 384-8037 for further information and assistance.

Writing Center and Mathematics Center

The Writing Center (located in the Slider Humanities & Fine Arts Building), and the Mathematics Center (located in the Fugitte Science Building) are available for specialized tutoring at no charge to students. Please contact Jared Odd, Writing Center Coordinator, at 384-8209 or Linda Kessler, Math Tutor Coordinator, at 384-8115 for further information and assistance.

Final Exams
Final Exams for day classes are scheduled for the Fall 2015 semester on **December 7-11 and May 4-8** for the Spring 2016 semester. The academic calendar, which contains the schedule for finals, is in the College Catalog and course schedule listing. Please make any necessary flight arrangements **after** the final exam week. **Students will not be permitted to take early finals** unless extenuating circumstances exist. "Extenuating circumstance" means illness, a verified family emergency or participation in officially sponsored travel in support of an event arranged by the College. **Travel arrangements must be made in sufficient time** that tickets may be obtained after final exams and the semester is officially over. All requests for early finals must be made in person to the Academic Affairs Office.

Email Policy
All Lindsey Wilson College students are required to communicate with LWC faculty and staff via LWC (Lindsey.edu) email addresses only. Alternative email addresses should not be used when communicating with LWC faculty and staff.

Cell Phone Policy
Student cell phones will be off during class time unless prior arrangement is made with the instructor.

Adding/Dropping a Course

Students enrolled in the following courses cannot drop these classes during the semester: READ 0713, 0723, 0733, 0903, 1013 and 1023; STSK 1003; ENGL 0903 and 0904; and ESL 0803, 0804 and 0854.

For undergraduate classes at the Columbia campus, adding a course, dropping a course, or changing from one section of a course to another section of the same course requires the approval of the advisor and the instructor for each course involved as indicated on the Add/Drop Form. The change must be reported to the Business Office and the Registrar's Office on an Add/Drop Form, which may be obtained from the Registrar's Office. For AIM courses, adding a course, dropping a course, or changing from one section of a course to another section of the same course requires the approval of the Director of the Evening Program. For courses taught at Community sites, adding a course, dropping a course, or changing from one section of a course to another section of the same course requires the approval of the Site Coordinator for the campus. Permission to add courses will not be given after the last date for late registration. Authorization for dropping a course will not be approved after more than 75% of the instructional days for a course are completed, as outlined below:

Course	Deadline	Submitted by the Student to
Columbia undergraduate and graduate full semester courses	Not later than 30 days before the end of the semester	Registrar
AIM courses	By the sixth week of class	Registrar
Courses at Community Campuses	By the third weekend of class	Site Coordinator or the Registrar

If changes are not properly approved and officially reported as stated above, students will receive a grade of F in the courses for which they are officially registered, and they will be charged for all such courses. Students will not receive credit for changed or added courses unless they officially register for those courses.