

Chemistry 214-002, Quantitative Analysis Laboratory

Spring 2015 Syllabus

Chem 214-002, Quantitative Analysis Laboratory (1 credit hour), Tuesdays/Thursdays 2:30-5:15pm, FH-313
Prerequisite: Chem 106/102 and 112, Chem 222/224 and 226 as well as active attendance or completion of lecture Chem 212.

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Office Hours: Monday & Wednesday 9-11am,
and by appointment.

Course Objectives:

- 1) To acquaint students with some of the classical and modern techniques in analytical chemistry
- 2) To teach wet chemical lab skills, efficiency and planning of experiments
- 3) To teach critical evaluation of experimental results
- 4) To become familiar with conventional data collection in commercial and academic laboratories.

Attendance Policy: It is expected students attend every scheduled lab session. Additional time will not be provided to students who are absent from lab. Students are allowed to attend only the section in which they are enrolled. Students cannot attend the Monday/Wednesday section under any circumstances; this is university policy. Students must have required materials and be properly dressed to perform experiments in the lab. Make-up exams and quizzes *will not* be given unless approved by the Instructor. Students are required to initial a sign-in sheet on each day of lab, documenting and verifying their attendance. This sheet serves as a formal record. If an absence does occur, it is the responsibility of the student to contact the Instructor as soon as possible.

Footwear/Clothing: Closed toed, closed heel shoes are required [no slippers, Crocs, perforated shoes, etc.] No skin on the foot can be exposed (ballet flats are not allowed unless socks are worn to cover the entire foot). Long pants are recommended. Shorts and skirts are not allowed, as bare skin on the lower extremities is a safety hazard: Be advised, concentrated acids/bases will be used in most of the experiments. *Lab coats are required and must be worn at all times.* Students will be sent home if proper clothing/footwear are not worn, this counts as an absence. A safety lecture will be given the 1st day of class; this lecture is required to perform lab experiments. Students will sign a safety sheet acknowledging their understanding of lab safety rules/policies.

Required Materials:

- One bound (NO SPIRAL) *laboratory notebook* such as a national-brand Composition book.
- An inexpensive *calculator* having logarithm (base 10 and e), exponential, and trig functions.
- A pair of *lab goggles* [safety glasses NOT allowed] which must be worn at all times in the laboratory.
- *Lab coat.* Offers a layer of protection against hazards. Any color is fine, but it must be long sleeve. Lab coat must be worn at all times in the laboratory. Amazon or the Loyola bookstore sell them.
- Laboratory procedures and handouts (always available in Sakai)
- Non-erasable pen [scientists do not write in pencil or in erasable ink]. White out is not allowed.
- Use of Sakai (frequent access and submissions of work, etc.)

For some lab experiments, it may be advantageous to bring a laptop for data entry/analysis or calculations. If deemed a distraction/hazard, the TA or Instructor may request that said computer be put away. Cell phones are a distraction and should not be in use during any portion of the laboratory.

Cell phones are not a calculator substitute. Cell phones are NOT allowed for use during quizzes, the midterm, or final exam nor should they be used during lab experiments.

Laboratory Procedures:

Instructor and TA will explain the procedures and goals for each experiment/assignment prior to its execution. Students will be given handouts for each experiment/assignment beforehand. Students are expected to read the lab experiment procedures ahead of time in order to comprehend the work and complete it safely in the laboratory. Experiment handouts will also be available on Sakai for viewing at any time. A semester laboratory schedule, detailing projected start dates for each lab experiment, pre-lab quizzes, lab report due dates, and other information will be provided on the first day of class. The schedule will be posted in Sakai and FH-313. It is also at the end of this syllabus and meant only to be a guide. Any aspect is subject to change.

Lab Experiment Unknown Samples (referred to as "Unknowns"):

In most cases, each student will be assigned a standard unknown sample whose composition is known to at least **FOUR** significant figures. **Each student will quantify a particular analyte of interest in their unknown sample and be graded on how accurately experimental determinations reflect the unknown's true composition.** Write down the unknown # in the lab notebook AND sign for it on formal sign-up sheets provided by the TA.

For each lab experiment's unknown, students will report, via Sakai, their values of each individual determination (trials), the mean concentration (or percent composition), standard deviation, and ppt associated with the overall determination. *Students will be permitted to repeat each lab experiment only once*, as time permits, in order to improve technique to potentially earn a better accuracy grade. However, for a redo the student must analyze a new/different unknown sample and it must be undertaken in the period established on the laboratory schedule. In order to accomplish this, **students should report experimentally determined results for their unknown sample via SAKAI as soon as one has completed the experiment & necessary calculations!** Only after Sakai submission will an accuracy grade be calculated [by Instructor] based on evaluating a student's experimental results in comparison to the known assay value. Then, a student can decide if he/she wishes to repeat the lab experiment. Final accuracy for an experimental unknown will be determined as the better of the two reported accuracy findings. Graded accuracy will determine about 61.9% of the course grade.

Laboratory Notebook:

Notebooks must be completed in PEN. Detailed notebook requirements are listed on pages 9-10. Notebooks must be organized but not necessarily perfect and thus can contain strikeouts. White-out is not allowed.

Students must come to lab prepared in order to optimize lab efficiency. At the start of every NEW experiment each student must have written in their notebook:

- 1) The date and title of the experiment and 2) An introductory paragraph summarizing the purpose of an experiment & overview that may include a very brief procedure synopsis.*

*Instructor or TA will review and sign off on this in the lab notebook in class (while a pre-lab quiz is being taken). A student will not be allowed to start an experiment until the notebook has these requirements completed. The notebook grade determines 4.1% of the overall course grade.

Laboratory Reports:

Lab reports must be computer generated and follow the format defined on page 7-8 of this syllabus. They are to be completed individually. Plagiarizing other students' reports (current or former), book or internet sources, or lab procedures will not be tolerated. Cite outside sources when applicable. All experimental data must be included. A lab report will always contain data from the first attempt and if applicable, a second attempt if an experiment is repeated (redo). Graded lab reports determine 16.5% of the overall course grade.

Lab report due dates are located on the semester schedule. Lab reports **will not** be accepted via email. They must be printed and handed in to the TA in lab, on the due date, within the first 15 minutes of the official lab start time (2:30pm). After 2:45pm, a lab report is considered late if it is not in the possession of the TA. If a student is not present at the beginning of class on the date a lab report is due, but comes into the laboratory at any point after the first 15 minutes of the official lab start time, their lab report is considered late when turned in and there are no exceptions. **Late lab reports will receive a 15% penalty deduction each day the report is late and result in a grade of zero if not received within one week of the due date.**

To assist students in improving writing skills and address any deficiencies, the first lab report (only) may be resubmitted (revised version) after the first version has been graded to receive at most $\frac{1}{2}$ the lost points back. Both the original graded version and revised version must be handed in. Please do discuss any questions, concerns about lab report with the TA or Instructor.

Over the course of the semester, 8 lab experiments will be completed. Each student is required to complete all 8 lab experiments and turn in experimental results for each. Writing skills are important to explain test results and other important information in the "real world," but we realize that completing lab reports is labor intensive. Therefore, students will only write lab reports for four (4) of the eight (8) labs in this course.

The following list* includes the lab experiments for which a written lab report is required:

- 1) Acid-Base Titration: Determination of % Carbonate in an Unknown (Lab 2)
- 2) Spectrophotometric Determination of Iron (Lab 3)
- 3) Atomic Absorption (Lab 5)
- 4) EDTA Lab: Determination of Calcium and Magnesium via Titration and IC Analysis (Lab 7)

*At the discretion of the Instructor or TA, this list can be modified at any time over the course of the semester.

Laboratory Exams:

Two written exams will cover concepts pertaining to the laboratory experiments. A Midterm exam will include **Experiments 1-4** and a Final exam will include **Experiments 5-8**. Exams will cover theory, lab technique, and related calculations. See schedule for exam dates. Exam grades determine 8.2% of the overall course grade.

Laboratory Quizzes (Pre-lab Quizzes):

Before the start of each new experiment a written, 15 minute pre-lab quiz will be given regarding background, procedure, and calculations to determine student preparedness for the lab experiment. **Quizzes will be given during the first 15 minutes of lab. Thus, be punctual and always get to lab on time! If one arrives late to lab, no extra time will be given to complete the quiz.** Quiz answers must be written in pen to receive credit. If absent on the day of a pre-lab quiz, it is the student's responsibility to schedule an appointment with the Instructor to make up the quiz BEFORE the next lab period; otherwise, student receives a zero (0) on the missed pre-lab quiz. Pre-lab quizzes account for 4.0% of the overall course grade.

Services for Students with Disabilities (SSWD) Policy:

Necessary accommodations will be made for students with disabilities who procure a SSWD letter. Do discuss your academic needs with the Instructor as soon as possible! However, to receive any accommodations self-disclosure, proper documentation, and registration with the SSWD office at Loyola University Chicago is required. Accommodations cannot be made until the Instructor receives proper documentation. Furthermore, accommodations are not retro-active and begin only once appropriate documentation has been received by the Instructor in a timely manner. Only those accommodations that are specifically listed in the formal SSWD letter will be provided. Policies and procedures for SSWD can be found here: <http://www.luc.edu/sswd/>

Journal Article Assignment:

Referencing scientific journal articles is an important aspect of research. Each student will be responsible for selecting, reading, and writing a report on an article published in either *Analytical Chemistry* or the *Journal of Analytical Chemistry*. This assignment will aid students in recognizing principles of analytical chemistry and the importance of method development and application. Detailed information for this assignment will be handed out and posted in Sakai. The final report and a copy of the journal article read must be submitted in Sakai under *Assignments*. In person, print copies of the completed report & article will not be accepted. The due date is in the laboratory schedule. This assignment determines 3.3% of the overall course grade.

Academic Honesty:

Both instructor and TA encourage students to consult one another during lab experiments and outside of class. Students can converse, brainstorm, and work through questions together but copying other students' work and presenting it as one's own is unacceptable. There is a difference between sharing knowledge and cheating.

If it is determined that lab reports or other materials in this course are plagiarized or have been shared between students (current or past), no credit will be given. Cases of suspect academic dishonesty will be handled according to University policy and guidelines. Please review Loyola University Chicago's policy on Academic Integrity via this link: http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml

Safety Points:

Unsafe actions in the laboratory will NOT be tolerated. Each day of lab is essentially allotted 1 safety point. Students either earn the point, or do not. It is all or nothing. A student will be told when a safety infraction has been witnessed by TA/Instructor and that a safety point was lost for the day. This tally will be documented on the daily sign-in sheet. Safety points count towards 1% of the overall course grade.

Safety point deductions will occur if Instructor or TA witness unsafe behavior such as:*

Taking goggles off in the laboratory at any point when chemicals/glassware are on any of the 3 lab benches, not wearing goggles when using/cleaning glassware or chemicals/equipment, not wearing a lab coat, borrowing goggles or lab coat for a day, chewing gum, coming late to lab, touching face with gloves, leaving laboratory with gloves on, using cell phone with gloves on, not cleaning up chemical spills on bench top/analytical balance/fume hood, eating/drinking in the lab, standing on chairs, improper disposal of chemicals, etc. *List is not exhaustive; if it is determined an action performed is unsafe, even if is not listed above, student will lose a day's safety point.

Grading Policy:

The established grading policy is subject to change at Instructor and/or TA discretion. Please note the University uses a +/- grading scale system and it will be implemented in this course.

Grading Category	Pts	Percent
Analytical Findings (Accuracy)*	1500	61.9%
Detailed Laboratory Reports	400	16.5%
Lab Quizzes	96	4.0%
Lab Notebook	100	4.1%
Journal Article Assignment	80	3.3%
Safety points	25	1.0%
Social justice in class worksheet	24	1.0%
Midterm and Final exam	200	8.2%
Total	2425	100.0%

Grade Assignment:

Points Range	Letter Grade
2183 - 2425	A- to A
1940 - 2182	B-, B, or B+
1698 - 1939	C-, C, or C+
1455 - 1697	D-, D, or D+
Below 1455	F

*7 labs @ 200pts each, 1 lab @ 100pts each for accuracy

Typical Grading Scale* (%): A 100-94.0, A- 93.9-90.0, B+ 89.9-86.9, B 86.8-83.0, B- 82.9-79.9, C+ 79.8-77.0, C 76.9-72.9, C- 72.8-70.0, D+ 69.9-67.9, D 67.8-63.0, D- 62.9-60.0, F ≤ 59.9

*subject to change at the discretion of Instructor.

Lab Report and Notebook Grading Rubrics:

The following is a generous guide of lab report and notebook grading. Point redistribution at the discretion of the Instructor and TA is possible if deemed necessary.

Lab Report	Points
Title Page	4
Purpose	6
Materials	10
Procedure	15
Results	35
Conclusion	20
Grammar/Formatting/Spelling	10
TOTAL	100

Notebook*	Points
Table of Contents	8
Title of experiment (1pt/experiment)	8
Introduction (signed**, 2pts/experiment)	16
Results/ Raw Data and Calculations (5pts/experiment)	50
Conclusion (2pts/experiment)	16
Organization (sections labeled, writing legible)	2
Total	100

*Point breakdown based on 8 lab experiments completed; may change based on class progress.

**Unsigned Introduction sections will receive no credit. No exceptions.

Social Justice in the Sciences:

One of the emphases of the Jesuit community is social justice. How can social justice be integrated or thought about in terms of the field of science? We will ponder this question in an in-class discussion and group activity near the end of the semester. There will be an in-class worksheet worth 20 points; this worksheet can only be completed in-class on the date of the discussion, which is listed in the schedule. Therefore, attendance is highly suggested. Here are a couple of resources that you may use to engage your thinking; use this information to brainstorm potential injustices pertaining to the sciences. Additional information in the form of a handout will be available later in the semester. This activity is meant to be an enlightening, interactive experience full of open conversation on the topic.

<http://blogs.luc.edu/socialjustice/social-outreach-resources/>

<http://jesuits.org/whatwedo?PAGE=DTN-20130520124035>

See the following pages for Lab Report and Notebook Requirements!

Lab Report Format and General Guidelines: Chem 214-002

Lab reports for Quantitative Analysis should be more detailed and complete than reports in the past for General or Organic Chemistry. This is an upper division lab class, and more thoroughness is expected of the student. The report write-up is a **VERY IMPORTANT** part of a laboratory based course, especially at the junior/senior undergraduate level and of course for graduate level work.

Lab reports consist of the following elements:

Title page – lab experiment name and number centered on the page; your name, lab partners name (for partner labs only), unknown #, and date the report is due should be placed in the lower right hand corner of the title page

Purpose – brief statement of the reason for performing this experiment

Materials – two separate lists: one for a listing of all equipment (including the balance used) and a second list for chemicals used (including unknowns, but excluding any solutions a student prepares)

- Concentrations of solutions used should be included. Include concentrations of stock solutions, not concentrations of solutions made. Concentrations of solutions made should be given under the results section.

Procedure – a list of all the steps that you did to perform the lab, including any changes that you may have made to the original printed procedure.

- This can be summarized from that listed in the lab handouts but must be rewritten in your own words! **Do not plagiarize.**
- It must be so clear that anyone not familiar with the lab would know exactly what to do.
- It should not contain the actual masses, volumes, etc. used by the student.
- Be careful writing preparation instructions for solutions. You will dissolve/dilute chemicals in a volume smaller than what the final volume will be and then dilute to the final volume mark.
For example: Dissolve 12 g KOH in 300 mL DI water, dilute to 500 mL mark, and invert to mix.

Results – list data obtained, such as volumes measured, weights, temperatures, in a table format

- Multiple trials must always be done to verify data as having good precision. All data must be shown, including repeat lab data.
- Data must be represented in table format with appropriate column and row headings and include the individually determined values, averages (for concentrations, percents, unknowns, etc.), standard deviations, and other necessary values. When applicable include units in column headings i.e. "NaOH volume (mL)" or "mL of NaOH." Tables must be labeled with appropriate brief titles describing the contents within a table.
- Statistical analysis of your data should also be put in this section.
- If applicable, graphs should go in this section, and they must be clearly labeled with a title and proper x axis and y axis names as well as units. Graphs should be done in Excel or similar program.

- Include calculations in this section labeled appropriately with units, chemical identity and properly identifying what is being calculated and the trial # the calculation is being completed for.
- Include general equations corresponding to each calculation necessary i.e. general equation for **dilutions** (see example below), average, standard deviation, ppt, to name a few. (ex.: Calculation for volume of HCl for 0.1M HCl). The calculations may be written, but please write them neatly so they can be read and understood.
 - Show an outline of equation being used and at least one example with your numbers
 - ex.: $m_1v_1=m_2v_2$ $12M \times (v_1)=0.1M \times (1000mL)$ $v_1=8.33$ mL
 - Please utilize leading zeros before the decimal point (0.1mL and not .1mL).
- A paragraph statement of the results must also be present to interpret/summarize the data shown in tables and graphs.
- If graphs/figures are included, such as spectra or chromatograms, they should be accompanied with a proper label i.e. Figure 1, and brief description directly below it.

Conclusion – a restatement of your results, and what the results mean

- Include a **detailed** analysis of error (at least 3 errors). This should be done based on the students own data and results. An analysis of error can also be done on theoretical errors as well though the student may not have made these errors.
 - How does the error change the outcome (concentration higher/lower than it should be, etc.)? How does the error affect the subsequent steps in the experiment?
- How can the experiment be improved and/or made simpler?
- How can the student's technique be improved?

Additional Considerations

- Order is also important for excellent scientific work – the lab report write-up must follow the order listed on these directions.
- Lab reports should have page numbers specifically located in the bottom center of each page. Please staple your lab reports before handing them in.
- Feel free to print double-sided; we are a sustainable university after all!
- All parts of this report must be typed (calculations are an exception). Please use 12 point font, 1.5 lines spacing for paragraphs, and 1 inch margins.
- Please keep entire tables on a single page. If you must split up a table, remember to include column and row headings again on the next page.
- Reports should have good spelling, sentence structure, etc. Do not use run-on sentences, fragments, or personal pronouns (I, we, me, etc.).
- Take the time to check over your work and re-read your report to make sure that what you wrote is clear and makes sense.

The following has been said:

“A student could do mediocre work and write up an excellent lab report, and the work will be thought of as wonderful. A student could do wonderful work and write it up poorly, and the work will be thought of as mediocre.”

Lab Notebook Guidelines and Grading Rubric

NOTEBOOK MUST BE COMPLETED IN PEN. Leave the first 2 pages of the notebook blank. At the top of these two pages please write TABLE OF CONTENTS. Over the course of the lab, label the pages in the lab notebook. Then in the table of contents simply write the name of each experiment. Next to the name, write the page # that the experiment starts on. It doesn't need to be more detailed than that.

On every day of lab work, the date should be written in the notebook at the beginning of class. This will allow you to keep track of what was completed on a particular date, including solutions prepared, experimental work and calculations.

Each of the sections of the notebook should be labeled as such using roman numerals and the section headings as displayed below.

At the start of each new experiment the following is required in the notebook at the beginning of lab (i.e. completed before coming to lab):

- I. Title of experiment, date
- II. Introduction: A paragraph synopsis/overview of what the point of the experiment is, methods (titration, precipitation, etc.) or instrumentation (if applicable) utilized in the experiment. From this short paragraph, someone reading your notebook will have a basic idea of what the experiment entails. The FIRST SENTENCE of the introduction should state the purpose/what will be discovered in the particular experiment. This paragraph can be roughly $\frac{1}{2}$ a page but no more than 1 page long.

Note: The instructor or TA will initial above sections of each experiment. It is the student's responsibility to get their notebook signed as required initials will count towards notebook point value. If this section is not initialed, 1pt deduction per missing signature.

- III. Procedure (optional)
If students find it helpful to write out the entire experiment's procedure in their own words in detail, they can do so in their notebook in this optional section. It is not a requirement as students will have the printed experimental procedure to reference while completing each experiment.
- IV. Results
First, the unknown number should be clearly written at the beginning of this section. This section, as described earlier in the syllabus, should contain only calculations for solutions you physically prepare in class, and all observations and pertinent data that is generated during the experiment. This includes but is not limited to color changes (initial solution color and endpoint color in a titration for example), initial/final buret readings for all experimental

trials, balance weights for solid samples, balance #, instrument settings, etc. Values written down should have units and chemical identity accompanying them i.e. 15.05mL of NaOH. All data should be written in pen. Strikeouts are acceptable as no notebook is perfect. If alterations or changes in an experimental procedure occur, this is the section to include that information as well.

V. Conclusion

Brief. Restate the purpose of the experiment and what was accomplished (one or two sentences that state your unknown number and what you found). If any major errors occurred in the experiment i.e. you accidentally dumped out one of your samples, etc. state that here as well.

Example: The purpose of this experiment was to determine the percent sodium carbonate in an unknown sample. In unknown #12, it was determined that the unknown sample contained 39.57% sodium carbonate.

*Format Check: You can request a format check after lab experiment #1 from your TA/Instructor.

Chem 214-002, Quantitative Analysis Lab, Spring 2015 Tentative Semester Schedule

Chem 214 Quantitative Analysis Schedule* (Spring 2015)					
Assignment Dates	Week #	Class #	Date	Proposed Experiment	Proposed Tasks**
Lab 1 Prelab Quiz	1	1	Tuesday, January 13, 2015	Syllabus, Safety Lecture, Equipment Check-in	Safety lecture. Lab equipment. Sig Figs / Glassware review. Prep solns.
	2	2	Thursday, January 15, 2015	1) Determination of % KHP in an Unknown	Standardize NaOH solution w/KHP; titrate unknowns
Lab 2 Prelab Quiz	2	3	Tuesday, January 20, 2015		Titrate unknowns, complete calculations, submit to Sakai
	3	4	Thursday, January 22, 2015	2) Determination of % Carbonate in an Unknown	Check NaOH molarity from lab #1; use for lab #2. OR begin lab #1 REDOS
Lab 3 Prelab Quiz	3	5	Tuesday, January 27, 2015		Standardize HCl and titrate unknowns OR lab #1 REDOS
Lab #2 Report Due	4	6	Thursday, January 29, 2015		Finish titrations; Continue REDOS of labs #1 & 2; clean vol flasks for lab #3
Lab 4 Prelab Quiz	4	7	Tuesday, February 03, 2015	3) Spectrophotometric Determination of Iron	Must complete in one lab session; Continue REDOS for labs #1 & 2
	5	8	Thursday, February 05, 2015	4) Assay of SO ₂ by Gravimetric Analysis of Sulfate	REDOS for lab #3; begin to heat/weigh crucibles for lab #4
Lab #3 Report Due	5	9	Tuesday, February 10, 2015		Lab #3 REDOS OR Prep unknown samples & digest, possibly filter
	6	10	Thursday, February 12, 2015		Reheat, then filter digested samples. Heat crucibles in oven w/product
	6	11	Tuesday, February 17, 2015		Heat/weigh crucibles with product. CLEAN out crucibles
	6	12	Thursday, February 19, 2015		CLEAN out crucibles. REDOS for lab #3 & 4
	7	13	Tuesday, February 24, 2015		REDOS. Wrap-up. Submit results; study for midterm. Clean glassware
LAB MID-TERM		14	Thursday, February 26, 2015	Midterm Exam / Notebook Check #1 / Cont. lab work	Bring Calculator and Notebook! Assays for labs 1-4 must be submitted in SAKAI by MIDNIGHT TONIGHT!
	8	15	Tuesday, March 03, 2015	Spring Break; NO CLASSES	No Class
	8	16	Thursday, March 05, 2015	Spring Break; NO CLASSES	No Class
Lab 5 Prelab Quiz	9	17	Tuesday, March 10, 2015	5) Atomic Absorption Lab	Prepare samples & standards; analyze samples; Vitc C prelab lecture
	9	18	Thursday, March 12, 2015		Analyze samples; analyze results; Vitc C prelab lecture
Lab 6 Prelab Quiz	10	19	Tuesday, March 17, 2015	6) Vitamin C Lab	Complete in one session. Prepare, standardize iodine soln; titrate unknown REDOS for lab #5 & 6. Prep EDTA soln for lab #7
Lab #5 Report Due, Lab 7 Prelab Quiz	10	20	Thursday, March 19, 2015		
	11	21	Tuesday, March 24, 2015	7) EDTA Lab	Prepare EDTA and CaCO ₃ solns; standardize EDTA. REDOS for lab #6
	11	22	Thursday, March 26, 2015		Standardize EDTA; titrate unknown; prep unknown IC dilution
Journal Article Assignment Due	12	23	Tuesday, March 31, 2015		Titrate unknowns; Prep IC unknown dil. Complete titration calculations
	12	24	Thursday, April 02, 2015	WE HAVE CLASS; Easter Break begins at 4:15pm	Analyze IC results; continue unknown titrations; clean glassware
Lab 8 Prelab Quiz	13	25	Tuesday, April 07, 2015	8) Polyprotic Acid bring laptops	Lab #7 REDOS. Restandardize NaOH from lab #2 OR prep new NaOH soln
	13	26	Thursday, April 09, 2015	bring laptops or tablet with excel type graphing program	pH titration of unknown acid; graph data during lab! Cont lab #7 REDOS
Lab #7 Report Due	14	27	Tuesday, April 14, 2015		pH titration of unknown acid; graph data during lab!
	14	28	Thursday, April 16, 2015		Lab #8 REDOS. Wrap-up all wet chemistry. Clean glassware.
	15	29	Tuesday, April 21, 2015	9) Social Justice in Chemistry, last day for lab #8 redos	Attendance especially required today; finish all remaining lab work!
LAB FINAL, Check-out		30	Thursday, April 23, 2015	Final Exam / Notebook Check #2 / Equipment checkout	Bring Calculator! Notebook Check. Clean glassware. Equipment Checkout. ALL ASSAYS for labs 5-8 must be in SAKAI BY NOON TODAY!

* This schedule is subject to change at the discretion of the Instructor or TA at any point during the semester

ALL LAB REPORTS ARE TO BE PRINTED OUT AND HANDED IN AT THE BEGINNING OF LAB (within the first 15 minutes after official lab start time) ON THE DUE DATE. They are considered late if not printed. Emailed lab reports will NOT be accepted under any circumstances.

** Please be advised that these proposed tasks should be used as a guide and are under no circumstances the only tasks that can be performed. This is the bare minimum.

*** This schedule is meant to be a guide, to clearly map out the vigor and expectations for this course. It is not all encompassing and students must be responsible enough to keep track/stay on task.

