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# Chem 315 lab:

## Quantitative Analysis lab

Credit Hours: Laboratory course

Prerequisites: Orgo 1

## Contact Us

Name: <PROF\_FULL\_NAME>

Email: <PROF\_EMAIL>

Phone #: <PHONE>

TA contact information is located in Teams.

## Meet with Me

Office Hours: Posted in Teams

Location: ISB 341E or ISB 355, Zoom: the link is posted in Teams

## When and where the class meets

Days/Time: Monday and Wednesday from 1:25-5:30 Tuesday from 8am to 12.

Building/Room: ISB 355C.

## Course Materials

### Required

Safety glasses or goggles (Campus Store or Amazon)

Lab coat (Campus Store or Amazon)

Cotton or flame retardant facemask (Campus Store or Amazon) or if you would prefer a higher rating mask, KF94 masks. Here is some information about a [reviewer](#) that gives [youtube reviews](#) about masks and testing procedures.

Microsoft office suite (<https://www.umass.edu/it/software/microsoft-office-365-education>) The local apps must be installed. We heavily use Excel and Word.

Microsoft Teams (<https://www.umass.edu/it/services/microsoft-teams>)

Zoom: Desktop application, Microphone, and web camera. Used for office hours or if participating remotely due to illness/quarantine.

## Recommended

Quantitative Chemical Analysis: Harris I personally normally reference any edition after the sixth

## Provided

Laptop for collecting data and recording your lab notes provided for you use during lab. You can bring your own, though be careful. I don't want your personal computer ruined by a lab accident.

Experiment manuals are available in Moodle, and hard copies are provided during the lab.

## A bit about the course

### Why should you care about this course?

I am excited to share with you the tools of analytical chemistry. All of you will use analytical chemistry experimental tools or interpretation skills to describe your own work. So, while you may not be passionate about the study of analytical chemistry, I hope you recognize where you might use some of these tools or understanding in your own work in the future. I will be trying to provide context for where different researchers in the department are using these tools.

### What requirements does this course satisfy?

For Chem minors

This course satisfies 4 credits of passed courses numbered 200 or higher.

For Chem BA/BS majors

This course satisfies one of the core requirements to complete the major.

### What is the basic structure of the course?

There are 12 lab sessions plus 1 make up sessions, for a total of 12 separate experiments or times for analysis. The first half of the semester is focused on teaching you the tools of analytical chemistry and the basics of working in a group. The second half of the semester is focused on giving you practice with different techniques and using statistics to interpret results.

You will be assigned to a pod of 4-8 students with sub groups of 2-4 students. Pods do the same experiment on different instruments and share results for the analysis. Each group is assigned a number that indicates the experiment order for the semester. See the section on Course Schedule to see the progression of experiments.

It is essential to prepare ahead of time to complete each experiment in the allotted time. This preparation consists of answering the pre-lab questions and understanding your notebook's tables, notes on the procedure, calculations, molecular structures, and safety, for example.

## My hopes and vision for the course

My research background is as a physical-analytical Chemist in single-molecule spectroscopy, and the fantasy would be for you to all become physical or analytical chemists. The reality is you won't all become physical-analytical chemists. Instead, I hope to expose you to a wide range of chemistry experiences so you can gain an appreciation of experimental analytical chemistry.

You all ask the questions: "What is this?", "How do we know for sure?" "How much do we have?" "Are these results reproducible?" The lab addresses who we know what we have and ways to certify mathematically if results are similar or different from others work. The quantity of work necessary for this course is designed to be done by a group of students because even if you become self-employed you will have to learn to work with others to accomplish long term goals.

## What will you learn along the way?

### Content Areas

1. Sample Preparation
2. Basic Statistical Analysis
3. Using Excel to do Analysis
4. Calibration curves
5. Instrument Response

### Key Learning Objectives

1. Use proper technical analytical technique.
2. Quantify the amount of a component present with increased accuracy and precision.
3. Identify relevant sources of error in sample preparation and measurement.
4. Analyze data statistically using analysis software.
5. Assess the quality of a given set of results.
6. Keep a neat and orderly laboratory notebook that can be used for future reference.
7. Clearly explain your results.
8. Design appropriate protocols to quantify an unknown.
9. Discuss the implications of your results and compare them to literature.
10. Connect quantitative analysis to a context outside of the lab.
11. Assess your ability as a team player.

## What will help you to be successful in this course?

### Disability Accommodation and Inclusive Learning Statement

Your success in this class is important to me. This course is challenging and has many assignments to coordinate. We all learn differently and bring different strengths and needs to the class. If there are aspects of the course that prevent you from learning or make you feel excluded, please

let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

If you have a disability and require accommodations, please let me know as soon as possible. You will need to register with Disability Services (161 Whitmore Administration building; phone <PHONE>). Information on services and materials for registering is also available on their website [www.umass.edu/disability](http://www.umass.edu/disability). I have found student's stress/anxiety reduce by making arrangements at the beginning of the semester and ending up not needing them.

There is a range of resources on campus, including:

- [Writing Center](http://www.umass.edu/writingcenter) - <http://www.umass.edu/writingcenter>
- [Learning Resource Center](http://www.umass.edu/lrc) - <http://www.umass.edu/lrc>
- [Student Success](https://www.umass.edu/studentsuccess/) - <https://www.umass.edu/studentsuccess/>
- [Center for Counseling and Psychological Health \(CCPH\)](http://www.umass.edu/counseling) - <http://www.umass.edu/counseling>
- [English as a Second Language \(ESL\) Program](http://www.umass.edu/esl) - <http://www.umass.edu/esl>

## What you need to know about the technology we are using

Our Moodle site is the central hub for this course. On Moodle, you will find items such as the syllabus, announcements, course materials, assignments, grades, and other relevant course information. There is also a forum which I will use to send updates and reminders during the semester. Please make sure to check Moodle regularly.

Gradescope is where all Lab notebooks, Excels, and Reports are submitted (at minimum). Note, the dates in Gradescope may not match your particular group or lab section because of technical reasons I can't control. Please be aware of when you are to submit work according to the syllabus. Lab notebooks are due at the end of your lab, Excels, and reports are due at the beginning of your next lab.

Zoom is how office hours are conducted. The links are posted in Moodle. Zoom is also how you can participate if you are sick, but have enough energy to engage with class (more details in Attendance and Participation).

## Regular communication is essential! Here is our communication plan.

### Channels, Email, & Phone

1. For general course questions, your first go-to stop should be the General Channel in Teams and the course syllabus. If you don't find the answer there, post your question to the General Channel to ask your peers. If you know the answer to one of your classmates' questions, please answer it! Please set up notifications from teams that you get at the very least a daily digest.
2. If you can't get an answer from the General Channel or if you have a personal question or one related to your course work, please use messaging in teams to contact the TAs and me. If you want an even more private communication, please email me directly at <PROF\_EMAIL>. I try to check my email once in the morning and once at the end of the

day. I don't normally check my email on the weekend. During the work week I try to respond to emails within 24-48 hours.

3. Should you encounter a crisis that requires my immediate attention, you may call me at my office: <PHONE>.
4. I and/or the TAs will regularly communicate important information and course updates through the General Channel in Teams. When necessary, I or a TA will send out an additional announcements with reminders or other important information.
5. In the Class Notebook each experiment has a page associated with each experiment so we can have consistent communication about the experiments. You can post questions and you can see questions your peers have asked and be able to answer each other's questions. It is your responsibility to check these pages.

### Student/Office Hours

This is a time that I reserve for you. Meeting with me is an important part in supporting you throughout this course. Even if you don't have specific questions, needs, and concerns, I would love to talk with you at least once during this semester outside of class. All office hours will be held via zoom this semester. There are a couple of options to connect with me:

1. I will share the Zoom link for drop-ins on Teams.
2. Schedule a longer meeting with me if you need help with specific course content or your course work.

The TAs also reserve time for you. The information on how to connect with them outside of the lab period will be posted in Teams. (Zoom link and email)

### Names & Pronouns

Everyone has the right to be addressed by the name and pronouns that they use for themselves. You can indicate your preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. I am committed to ensuring that I address you with your chosen name and pronouns. Please let me know what name and pronouns I should use for you if they are not on the roster. Please remember: A student's chosen name and pronouns are to be respected at all times in the classroom.

To learn more read: [Intro Handout on Pronouns](#)

[https://www.umass.edu/stonewall/sites/default/files/pronouns\\_intro.pdf](https://www.umass.edu/stonewall/sites/default/files/pronouns_intro.pdf)

### Attendance & Participation

A large aspect of chemistry is working not just with the concepts in your mind, electronically, or on paper, it is actually to work with the chemicals in a laboratory setting. In order to address this kinesthetic aspect of chemistry, this course is held face to face in the lab.

We are taking as many precautions as we can reasonably take to keep you and your peers safe while being face to face. As such, please respect all of our requirements for personal protective equipment, including facemasks, face shields, and gloves. The exception to a facemask is if a



documented disability accommodation has been made for wearing a facemask. If you are not respecting these requirements you will be asked to leave and I will contact the Dean of Students to follow up with you about following the [Community Agreement](#).

### Absences:

Unless excused by the instructor, students must attend all labs periods and complete appropriate assignments.

You are excused if you are sick (cough, sniffles, and/or fever), please do not attend for the health of your partners and the instructors. Consider that you may be working with those that are medically vulnerable or like me live with people that are medically vulnerable. We will arrange another time for you to make up the lab or if you are feeling well enough to participate remotely, we will have you Zoom into lab and you will keep the lab notebook for the day and perhaps control the instrument from home.

In general, if you are unable to attend lab or complete individual or group work in a timely fashion, be in contact (email or message in teams) with me so we can make reasonable and appropriate accommodations. I can also direct you to the appropriate support. (UHS, Dean of Students, Disability services, etc.)

Student athletes, members of the band, and on occasion, students who are members of other groups will be allowed to miss class for games and other special events and make up work will be assigned.

See <https://www.umass.edu/religious-observance> for University attendance policies for religious observances.

### Preparation:

If you do not arrive prepared for the lab (not correctly attired, pre lab not completed), you may not participate in the lab that day. You may use your make up the lab for a deduction. See the grading rubric for relevant deductions.

### Participation:

Being active and engaged in class will provide you with the deepest learning experience. To get the most out of this class, you will need to actively engage with the experiment, your group, and the resources provided in Teams.

Strong participation means completing the assignments, being actively involved in discussions, asking questions, and demonstrating that you read and have thought about the material. Participation translates through showing curiosity about others' perspectives on an issue, demonstrating respect for others opinions and ideas through acknowledging their view and asking for clarification when you aren't sure. During lab, participation also means focusing on what is going on (being present), stepping up when you have a contribution and stepping back when it is time for others to talk or carry out portions of the experiments. More details on the break down will be provided in the section "How will you be graded?"

## Group Responsibilities:

Each member of the group will have a specific responsibilities. **Prior to each lab, each member of the group, no matter what their specific role is, must read the protocol for that day.** You will rotate responsibilities so that by the end of the course, everyone in a group will have experience with each type of responsibility. **There will be times that you will be extremely busy and others not busy at all.** (The "not busy" times are a good opportunity to discuss the lab write-up within your group and work on the analysis.) Your success will depend on your ability to come prepared, listen carefully, pay attention to protocol details, and cooperate with others.

## Our Class Participation Agreements

Check out the Class Participation agreement in the Class Notebook. There are some general expectations necessary for cultivating an inclusive and supportive learning community.

Please read the document carefully and engage actively with it by adding those norms that you'd like other course participants to agree to so that you and your classmates can fully participate.

## What you need to know about Academic Honesty and Plagiarism

We want our learning environment to be honest and fair. UMass Amherst has an [Academic Honesty Policy](#) that includes cheating and plagiarism as forms of dishonesty.

What is [plagiarism](#)? Generally speaking, it is any attempt to take credit for work done by another person. Yet, all scholars rely on the work of others to shape their own knowledge and interpretations.

This means: In your writing, you must acknowledge the importance of other works through footnotes and/or direct textual references to influential books, articles, media texts (yes, including Internet resources!), and ideas. When you...

- use other people's sentences, words, or concepts...
- summarize or paraphrase ideas or opinions...

you need to use quotation marks and/or cite your source.

Working with a professor, tutor, or friend to clarify your ideas and organization for a paper or presentation is generally not plagiarism. Using an outline or thesis given to you by someone else without substantial modification is plagiarism.

If you have any questions about what may constitute plagiarism, please consult with me and/or our Writing Center: [Writing, Plagiarism, & Academic Honesty at UMass Amherst Writing Center](#). [Purdue Owls Online Writing Lab](#) also provides a comprehensive guide related to plagiarism.

And here is a link to the [Academic Dishonesty Guide for Students](#).

## 10 Successful Learning Tips

1. Check your email every day to receive announcements and reminders in a timely manner.
2. Check our Teams site frequently.

3. Look ahead and create a study calendar for the whole semester. A note on due dates: you can submit an assignment prior to the due date. Once you know when an assignment is due, don't wait until the day before to start working on it.
4. Plan ahead! To be successful, keep up with all the materials and assignments, monitor and participate in discussion postings, and complete the assignments in accordance with the course schedule.
5. Space your learning throughout each week. This is commonly known as distributed practice or distributed learning. It has been scientifically proven to be a much more effective approach of learning than massed practice, meaning cramming your learning experience within big chunks of time.
6. Arrange a learning schedule that meets your individual needs for focused learning. Block off time at least during two days each week for engaging with the course materials and completing your assignments. You will need to invest approximately 3-8 hours per week outside of lab for reading, watching videos, and completing the various course assignments.
7. Set up an inspirational and quiet learning environment either in your home or another space, like a library, that is conducive to focused and uninterrupted learning.
8. If you encounter any technical issues, resolve them as quickly as possible. Most technical problems result from improper computer settings. If you encounter problems you cannot resolve, get help. Click the link: <https://www.umass.edu/it/support/moodle/help-students/to> locate a resolution and/or a contact.
9. Speak up! Asking for help is part of learning. Refer back to the section in the syllabus on communication.

## Use of Electronic Devices

While using computers and other electronic devices in class opens new learning possibilities for students, it can also be distracting.

Please use your electronic devices only for class related purposes, such as during lecture and notetaking times and if you need them as a means to make course content accessible.

Please set your phone on silent (not on vibrate) in class. If there are significant circumstances, such as a family emergency for which you may need to answer a phone call, please let me know before the start of class and put your phone on vibrate so you can quietly exit class and answer the call.

## Title IX

If you have been the victim of sexual violence, gender discrimination, or sexual harassment, the university can provide you with a variety of [support resources](#) and accommodations. UMass is committed to providing these resources with minimal impact and costs to survivors on a case-by-case basis. Resources are available to survivors with or without them filing a complaint. No upfront costs are charged to any currently enrolled students for University Health Services or the

Center for Counseling and Psychological Health, and no fees exist for services in the Dean of Students Office, the Center for Women and Community, Student Legal Services, or by live-in residential staff.

# What are you expected to do throughout the semester?

## Practical aspects:

1. Read/watch the resources and handouts carefully **before** the lab begins. Know how to use your lab notebook before coming to lab.
2. Know where the safety shower and an eyewash facility are located.
3. **STUDENTS MUST WEAR ADEQUATE EYE PROTECTION, SHOES, AND APPROPRIATE CLOTHING AT ALL TIMES!** This means: long pants or ankle-length skirt, short or long-sleeved shirts or a lab coat, and hair must be restrained if it can be. You must have closed-toe shoes, a facemask, face shield, gloves, and lab goggles on. These rules are for *your protection and protection of your peers*.
4. No eating, drinking, or chewing gum is allowed in the lab. *This is for your safety*. These are long labs so you may step out briefly (~5 min) and get a drink or a snack after coordinating with your partner and instructor.
5. Label all solutions **explicitly and immediately**, for you and your fellow students' safety.
6. Use the provided waste bottles for most wastes generated in the lab. Do not dispose of any solutions down the sink drains without first checking that it is safe to do so.
7. Mistakes and accidents happen to everyone, but once they occur, report them immediately.
8. Each experiment is set up in a specific area. Make sure it is left neat and clean. All reagents and glassware should be returned to their proper locations.
9. Electronic laboratory notebooks are used to record all of your information. You may be tempted to use scraps of paper, but these can get lost. In the real world, laboratories operate using defined procedures for keeping records. Getting into the habit of keeping a good notebook is very important.
10. Wipe down benchtop and the lab laptop when done.
11. Remember, your TAs and instructor are there to help. If you are unsure about a procedure or have a question about the instrument, theory or calculations consult him/her.

## How will you be graded?

### Grade Distribution Per Assignment

- a. Participation (10%)
- b. Quizzes (10%)
- c. Lab notebooks (15%)
- d. Excels (35%) (lowest Excel dropped after completing all experiments)
- e. Reports (30%) (lowest Report dropped after completing all experiments)

## Assignments

### Participation:

Evaluation of participation for yourself and your peers is a very important skill to develop. It gives you practice for when you will have to do self-evaluations and reviews of employees in the future. It also gives you a voice as to how your group is functioning and if you want to change that.

There are two parts to participation: Self-Evaluation of Participation (75%) and Catme evaluations (25%). The TAs and instructors are observing your preparation for and performance during labs and the course in general. We are looking for on-time arrival to the lab and good cooperation with your group members, including helping to organize, perform, and document the experiments and contributing to the group written assignments. You will reflect on this yourself each week.

The Catme grade incorporates feedback from your group members, *i.e.*, their evaluations of your participation. The consideration of these peer evaluations increases the fairness of the participation grade because group members observe a student's participation outside of class.

- Engagement: Were you: prompt, prepared, carried out your role in the group, worked well with your group members, and actively involved, for example?
- Catme: Approximately Tri-Weekly Peer and self-assessment to evaluate group health. If you completed your evaluation, the grade is based on the adjustment factor from Catme. If you did not complete your evaluation, you will receive a 0 for that assignment. **Either the final Catme grade or the semester average, whichever is higher, will adjust the lab notebook grades.**

### Quizzes:

There are multiple quizzes covering the analysis skills that are available in Moodle and are due by the start of week 7. These are designed to test your knowledge of the statistics and excel commands.

### Lab notebooks:

There are two parts to the lab notebook grade. The Pre-Lab (40%), the Group-Lab notebook (60%).

The Pre-Lab must be completed by 6 pm the day before lab for grading or you may not attend. The purpose of the pre-lab is to evaluate what you understand about the lab you are going to be doing the next day. So it will ask questions to prime your memory and about the details of what you will be doing experimentally and what you will need to record in your lab notebook. Note your answers in a [different color](#)

The Group-Lab notebook is based on what you do during the lab and is due before you leave the lab each day. Choose one of the group members Pre-lab notebooks and use it during lab. At the end of lab submit the revised document in Gradescope for the group.

1. (25%) Update the document

- a. Correct answers to pre-lab questions, the chemicals, the materials, and safety reflect the in class activities.
  - b. Indicate changes to the procedure by using the strike-through text tool and then writing what you did in the lab in a **different color**.
2. (60%) Accurately record information
  - a. Data is all recorded
  - b. Tables are well organized

*Table 1. Example Table for raw data*

Sample ID	Reading 1 (nm)	Reading 2 (nm)	Reading 3 (nm)
Sample 1			
Sample 2			

- c. Makes sure the units are correct for any numbers and sample preparation.
  - d. Include relevant calculations.
  - e. Make sure file names and file paths are all recorded in the notebook.

*Table 2. Example Table for File information:*

Primary folder:	Z:\Fileserv\Spring 2020\Chem 315\Experiments
Sample name(s)	File name(s)
Buffer capacity stock solutions	Buffer capacity-Mon1.csv

3. (15%) Legalize the document
  - a. Make sure to have partners sign the document
  - b. Make sure to get the TA to sign the document.
  - c. Make sure today's date is on the document

### Excels:

Data is what you collect in lab and leave on the server in your folders and/or record in your lab notebooks. Every file must be identifiable via file names and file locations from your lab notebooks or present in appropriate tables.

Each week you will complete an excel file with your raw data and the analysis of your data and submit it at the beginning of the next lab period. You should work with your teammates to complete the analysis. The analysis will be evaluated on organization, completion, and accuracy. Each person will need to submit. Gradescope allows group members to submit the same excel if they work together.

The Excels will be graded on multiple areas:

1. 20% Completion, & Accuracy and Precision of the raw data (Info & Data tabs)
2. 20% Organization & Correctly Calculating the Concentrations of unknowns (Concentrations tab)
3. 20% Organization & Correctly Calculating the Confidence intervals for the unknowns (Error Prop & CI tab)

4. 20% Organization & Correctly doing and interpreting the Hypothesis tests (Hypothesis Testing tab)
5. 20% Summary & Post Lab Question (Summary and Questions tab)

The raw data will be evaluated based on accuracy and precision for the known weeks. During unknown weeks only your precision will be evaluated. Tables 1 & 2 are the strictest scales that will be used.

Table 1. Accuracy is assessed by the percent difference from the known content of the sample or the literature values.

%Difference	≤1.0	1-2	3-5	6-10	11-25	26-50	51-100	100+
Score	10	9	8	7	6	5	4	2

Table 2. Precision is assessed by the percent relative standard deviation of your results.

%RSD	≤3	≤6	≤12	≤25	≤50	≥51
Score	10	8	6	4	2	0

We drop the lowest Excel if all the experiments have been completed.

## Reports:

There is one report format: Formal. All reports are to be completed and submitted to Gradescope by the beginning of your next lab period. You have three school days to submit the report after the due date to submit the report for reduced credit. There is a guide for writing reports posted in the course Google Drive.

Lab partners are expected to work together to gather and analyze the experimental data, prepare figures, and determine its significance. Lab reports **must** reflect the group's effort on these steps (In other words, I expect you all to have the same figures/tables) — final write-ups and discussions are done on your own.

We drop the lowest report if all the experiments have been completed.

- Formal Outline
  - 10% Introduction (Why we care)
  - 15% Experimental (What did you do)
  - 15% Results (tables/figures used to inform discussion)
  - 35% Discussion (Interpretation of tables/figures)
  - 10% Conclusion (summary of discussion and answers clients questions.
  - 5% References (JACS formatting)

## Late Policy

Deadlines work both ways, and the TAs and I will do our best to get all assignments graded and back to you in a timely manner. Our goal for the semester is to have report and lab notebook grades posted ~24hrs before the next report is due for work that is turned in on time.

If you know in advance that you cannot fulfill a required assignment you must notify me **and** your TA at least 2 weeks prior via the teams chat so we can make other arrangements. If you suddenly



need an extension, you must contact us least 24 hours in advance of when the assignment is due or as soon as you physical can.

Pre-labs are due at **6pm the day before your lab**, in order to prepare you for the next day's work and give us time to confirm/review your pre-lab.

Lab notebooks are **due at the end of the laboratory period**.

Lab Excels/reports are **due by the following lab period at the beginning of the class**. Excels/Reports turned in late are penalized per school day up to three school days (1 day-2.5% 2 days-5% and 3 days 10%. After three school days, they are not accepted. For example. If you have lab at 8am on Thursday, 1 day late is until 8am Friday 2 days late is until 8 am on Monday, and 3 days late is 8am on Tuesday. After 8 am on Tuesday the report is not accepted. In all cases, you should speak with the instructor as soon as possible about late reports. **It is your responsibility to make sure the work is submitted.**

Self-Evaluation of Participation are due at the end of the lab.

# Course Schedule

## Summary Table:

Week:	Topic	Monday	Tuesday	Wednesday	6pm the day before lab	Beginning of lab	Due at End of lab or special date
Week 1	Sample Prep	2/6	2/7	2/8	CATME Survey	Orientation Quiz	Group Contract G.L.N* & S.E.P.**
Week 2	Data Collection	2/13	2/14	2/15	Pre-lab	Excel	G.L.N. & S.E.P.
Week 3	Data Analysis	2/22 (Wednesday)	2/22	3/1	Pre-lab CATME Evaluation	Excel	G.L.N. & S.E.P.
Week 4	Stats	2/27 (week 3 report can be submitted 3/1)	2/28	3/8	None	Excel	None
Week 5	Standards	3/6	3/7	3/22	Pre-lab	Report	G.L.N. & S.E.P.
Week 6	Unknowns	3/20	3/21	3/29	Pre-lab CATME Evaluation	Excel	G.L.N. & S.E.P.
Round Robins begin							
Week 7	Standards	3/27	3/28	4/5	Pre-lab	Report	G.L.N. & S.E.P.
Week 8	Unknowns	4/3	4/4	4/12	Pre-lab	Excel	G.L.N. & S.E.P.
Week 9	Standards	4/10	4/11	4/19	Pre-lab	Report	G.L.N. & S.E.P.
Week 10	Unknowns	4/24	4/25	4/26	Pre-lab CATME Evaluation	Excel	G.L.N. & S.E.P.
Week 11	Standards	5/1	5/2	5/3	Pre-lab	Report	G.L.N. & S.E.P.
Week 12	Unknowns	5/8	5/9	5/10	Pre-lab	Excel	G.L.N. & S.E.P.
Week 13	Check out and Make up	5/15	5/16	5/17		Report	Faculty & TA Evaluations CATME Evaluation
Exams		<b>Final Exams</b>	<b>Final Exams</b>	<b>Final Exams</b>			

\*Group Lab Notebook (G.L.N.)

\*\*Self-Evaluation of Participation (S.E.P.)

## Round-Robins

### *Analytical Training*

In the first six weeks of the lab we will be training you how to prepare samples analytically, organize your data, statistically analyze your results, how to interpret your results, and communicate the results in a written report.

	Assessment	Report-Experiment	Process Skill
Week 1	Excel	Buffer Capacity: Sample Preparation	Teamwork
Week 2	Excel	Buffer Capacity: Data Collection	Management
Week 3	Excel	Buffer Capacity: Data Analysis	Information Processing
Week 4	Report	Stats	Oral & Written Communication
Week 5	Excel	Technique Comparison: Standards	Problem Solving
Week 6	Report	Technique Comparison: Unknowns	Problem Solving

### *Quality Control and Unknown Analysis*

In the second half of the semester we will focus on three different experiments that will test you ability to excute the technique and then analyze samples with unknown concentrations. The first week you will learn a technique or style of analysis. You will report the results for this experiment with a detailed Excel file. The second week you will be using that technique to identify an unknown. The results for the second week will be reported in a report.

During weeks 7-13 the experiments will be done in a round robin style. This means that there will be six instruments in operation each week. Each week you will be working on a new instrument. The table below shows which pod will be doing what experiment and which sub pod will be on what instrument.

	Process Skill	Assessment	Internal Standards		Standard Addition constant volume		External Calibration Curve	
			GC	GC-MS	UV-Vis	Fluorimeter	HPLC	LC-MS
Week 7	Information Processing	Excel	A1	A2	B1	B2	C1	C2
Week 8	Information Processing	Report	A2	A1	B2	B1	C2	C1
Week 9	Critical Thinking	Excel	B1	B2	C1	C2	A1	A2
Week 10	Critical Thinking	Report	B2	B1	C2	C1	A2	A1
Week 11	Assessment	Excel	C1	C2	A1	A2	B1	B2
Week 12	Assessment	Report	C2	C1	A2	A1	B2	B1
Week 13			Grade Check, final group Catme, SRTI's, and TA evaluations					