
■ Instructor

Professor Mathew Maye

Office Hours: Friday 1-3pm & by appointment

Office: CST 4-014D

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■ Teaching Assistants

Office hours are held in LSC 115.

Laxmikant Pathade Section: 002,003

Office hours: Thursday 10-12 PM

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Lili Karam

Section: 003,004

Office hours: Monday 01-03 PM

E-mail: lmaram@syr.edu

■ Undergraduate Laboratory Supervisor

Gary Bonomo

Office hours: By appointment

Office LSC 012A

E-mail: gbonomo@syr.edu

■ Laboratory Sections

Section M002: Tuesday 3:30-6:15 pm

Section M003: Wednesday 12:45 - 3:30 pm

Section M004: Wednesday 3:45 - 6:30 pm

■ Laboratory

Room LSC 101 (Life Sciences Complex)

■ Chemistry Department

Office: CST Room 1-014

Web: chem.syr.edu, nano.syr.edu

Facebook: www.facebook.com/ChemistryAtSU

■ Course Description & Goals

This laboratory course is designed to introduce general chemistry experiments to Honors students, and students who expect to major in chemistry. This laboratory supplements the lecture course, Honors General Chemistry (CHE 109), but is an independent course. The course is designed to introduce a breadth of chemistry experiments, introduce you to scientific writing at the college level, and to provide you with hands on experience with scientific instrumentation. Your success in this course will greatly depend on your pre-lab preparation. A key component of this course is not simply your carrying out the lab, but to inspire you to craft your note taking, experimental technique, and scientific writing style.

■ Lecture

There is no separate lecture, **and this course is not integrated with CHE 109** (Honors General Chemistry). A brief lecture will introduce each laboratory experiment.

■ Materials

Laboratory Manuals/Handouts will be provided to the students during the Check-in lab (first week). A notebook must be purchased and brought to the first class. Safety glasses will be provided.

■ General

The first lab will be meeting on August 30, or 31, 2016 (depending on your session) either at 3:30-6:15 pm (T), 12:45-3:30 pm (W), or 3:45-6:30 pm (W) in LSC (Life Sciences Complex) 101.

■ Grading

Pre-Lab assignments = 15%, Laboratory Technique & Preparation = 35%, Laboratory Reports = 50%

■ The Labs

You will be assigned a workstation at the first lab class. Each week you will be responsible for completing your **pre-lab** assignments, preparing for the lab by reading the lab and **describing the procedures in your notebook, carrying out the lab** in a timely and organized manner, and **submitting a final typed lab report a week later**. These are described in detail below.

■ The Pre Lab Assignments

Each lab will have a set of pre-lab exercises and questions designed to introduce the topic, the calculations required, and the fundamentals behind the experiment. **These assignments are required to be completed before the lab can be started**. TA may refuse you entry in the lab if the pre-labs are incomplete. For some labs, an additional worksheet may be added to the pre-lab. Your assignments should be completed in your notebook, and your TA will sign the work when presented.

■ The Notebook

The experimental notebook is holy to the scientist. Every good experimentalist has their own style of reporting in a notebook, but in general, the more organized and detailed the better. In our lab, **ALL WORK** must be completed in your lab notebook in **INK**. At the end of your lab, the TA will mark the end of the experiment, and any work done (calculations, comments, etc.) must be done after this mark. **AT NO TIME** can measurements, quantities, observations *listed above* the TA signature be added or changed after the lab.

The notebook should follow this general sequence for each lab:

- (1) *Title: The title and date of the experiment.*
- (2) *Pre-Lab Exercises: Please show all work and reasoning.*
- (3) *Procedures: 'Sketch' out the experiment in your own words, what will you do first, what glassware will you need to look for when entering the lab, are there calculations you can do ahead of time?*
- (4) *Experimental Observations & Values: This is the most important section, write all of your measured values, your observations, what worked, what didn't, did you try a second time, your opinions and sources of error.*
- (5) *Conclusions: Write a brief statement at the end as a conclusion, which is the area of the notebook your TA will sign & Date. Nothing can be changed above this signature.*

The picture of your experiment is required to be turned in with your final Lab report.

■ The Lab Report

After each experiment you have one week to submit a typed Lab Report via Blackboard. Reports are due a week later, Thursday before 5:00 pm. The lab report should not be verbatim of your lab notebook, but should be an account of the lab written in your own words and in a scientific style. While some labs will require you to work in teams, the **LAB REPORT MUST BE ORIGINAL AND FREE OF PLAGIARISM IN ANY FORM**. All the reports will be submitted via Blackboard/Turn-it-in[®] and thus will be automatically checked for any instance of plagiarism. Lab reports from each of the three sections will be compared, and any copied lab reports from team members, others in the lab, another sections, or the web will result in a zero grade for the lab, and will be reported to the appropriate university officials. It is the students' responsibility to solve any Internet access issues before lab.

The lab report must follow this sequence for each lab: (2-3 pages, 11 pt Arial font, double spaced).

- (1) *Title: Are you going to use the same title or spice it up a bit?*
- (2) *Introduction (1-2 Paragraphs): Here describe a bit about the experiment, why is it interesting, why not? What are the real world connections? You can do a brief Internet search to learn a bit more about the broader topic.*
- (3) *Experimental (1 page): In your own words, describe the experimental procedures carried out. You can use the manual for guidance, but put it in your own words, do not plagiarize the handouts.*

- (4) Results and Discussion (2-3 paragraphs): Describe your experiments and observations. What did you do first, what were the values you measured and calculations? You can make reference to your lab notebook. For example, "The diagram of the apparatus is shown in my lab notebook page 31.." or "The complete calculation is shown on page 18 of my notebook." As a discussion, postulate why things may be happening the way they are, this is important, since you may not have learned some parts in lecture yet. For labs that use instrumentation, present a polished final graph from Excel or other programs.
- (5) Conclusions (1 paragraph): Briefly summarize the experiment and your results. Was it a successful lab, if not, what were the problems or the potential sources of error? How would you rate it on scale of 1-10 and why? If you were to do it again (or improve the lab) what would you do?
- (6) References (need minimum 3 references): If you used any Internet, book, or literature sources, make sure to cite them appropriately in the text and list them here. Follow ACS style for citing references (<http://library.williams.edu/citing/styles/acs.php>)
- (7) Include the picture of your pre-lab & observations (from the notebook) along with your report, so that your TAs can grade and compare your reports.

■ Laboratory Technique and Preparation

In order to complete the labs on time and successfully, you need to show the proper technique and have prepared. Technique is a learned skill, so observe your TA and ask questions, while preparation requires a bit of time before lab. Writing down a brief preparation statement in your notebook before attending the lab is required and will get you ready for the lab.

■ Punctuality:

Please do not be late. It would be easier for the TA to go over your pre-labs if you come in ~5 minutes early. The first 20 minutes will be a lecture introducing to the lab and techniques. You will not be able to begin a lab until your pre-lab has been completed and deemed satisfactory by the TA. Late lab reports (past Thursday deadline) will automatically lose 25%, and lose an additional 10% each day.

■ Missing a Lab:

Please don't miss a lab. There are no makeup labs. If you have a documented excuse your final grade will be prorated. If you know in advance you will miss a lab, please contact Prof. Maye. Absences due to family emergencies, sickness, etc. need to be documented with proper documentation (verified by Chemistry staff). *It is not sufficient to just visit the health center.*

■ Switching Sections:

Once you have been assigned to a section, you are **NOT** allowed to switch sections during the semester, unless approved ahead of time by Prof. Maye (see above).

■ Cheating and Plagiarism

Simply put, any instance of cheating and plagiarism will be reported to the College of Arts & Sciences, and a disciplinary meeting will be scheduled. In the lab, there are two sources of plagiarism; calculations / values, and the lab report. Do not copy your partners work, you must do your own calculations and form your own observations. The Syracuse University Academic Integrity Policy can be found at <http://academicintegrity.syr.edu>.

■ Disability-Related Accommodations

Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS, <http://disabilityservices.syr.edu>), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor.

■ Religious Holidays

No student will be refused in the class because he or she is unable to participate in a class requirement due to his or her religious holiday requirements. However, you must make arrangements with Prof. Maye and your

Teaching Assistant *before* such absences. **SU's religious observances policy** can be found at http://supolicies.syr.edu/emp_ben/religious_observance.htm.

■ Safety in the Chemical Laboratory

Safety glasses must be worn at all the times in the lab. You are not allowed to wear shorts, dresses, open shoes, or contact lenses. We will go over safety in week one, and will introduce you to any hazards during the introduction to each laboratory. Please ask questions if you are concerned about any part of a laboratory exercise. Please report any hazards created during the lab, such as broken glass, or spills, your TA will take care of those. **There is no eating in the lab.** Food/coffee should be left in the backpack area. If you do not adhere to the safety rules of the lab you will be asked to leave and will be assigned a zero for that week's work.

CHE 129 Course Calendar, Fall 2016: (Subject to change)

Dates	Experiment
August 30/31	1. Check-in and Safety Review: An overview of safety practices, including a discussion of materials safety data sheets, procedures to follow in case of an accident, chemical safety agreement.
Sept. 6/7	2. Preparation of strontium iodate monohydrate: Prepare strontium iodate monohydrate from the reaction of a solution of strontium nitrate and a solution of potassium iodate. Calculate the percentage yield of a compound.
Sept. 13/14	3. The Synthesis and Analysis of Alum: The term alum is a general family name for crystalline substances composed of cations with 1+ and 3+ charges. In this experiment you will synthesize an alum named potassium aluminum sulfate dodecahydrate, $KAl(SO_4)_2 \cdot 12H_2O$. Determine melting temperature, and the percent sulfate of a sample of alum. <i>*Note: The final analysis may be completed at the beginning of the next week's lab.</i>
Sept. 20/21	4. Biuret Assay - Determination of Protein Concentration: The concentration of Bovine Serum Albumin (BSA) is determined via direct and assay monitoring. We will use Biuret Reagent and UV/Vis Spectroscopy.
Sept. 27/28	5. An Oxidation-Reduction Titration: Perform a quantitative titration to determine the redox reaction between Fe^{2+} and Ce^{4+} cations.
Oct. 4/5	6. Determination of Enthalpy of a Chemical Reaction and the Enthalpy of Neutralization of Phosphoric Acid: Acid-base reactions can be observed and measured thermodynamically. If the temperature of the reaction is measured precisely, the enthalpy of neutralization can be determined.
Oct. 11/12	7. Separation and Qualitative Analysis of Cations: Prepare multiple samples of cations, separate and identify the unknown.
Oct. 18/19	8. Solid State Modeling: Create unit cell models using a modeling kit. We will explore packing in common basic unit cells such as b.c.c., f.c.c., wurtzite, zinc blende, and perovskites. Basics of X-ray diffraction analysis will be discussed.
Oct. 25/26	9. Optical Properties of Fluorescent Compounds: Compare and contrast the optical properties of fluorescent molecules, proteins, and quantum dots using UV-visible and fluorescence spectroscopy.
Nov. 1 /2	10. Special Topics A, B, and C. (see below)

Nov. 8/9	11. Special Topics A, B, and C. (see below)
Nov. 15/16	12. Special Topics A, B, and C. (see below)
Nov. 22/23	No CHE 129 Lab – Thanksgiving Break
Dec. 1	<i>Final reports submission for topics A-C / Check Out</i>

■ Special Research Topics:

Special topic labs will be used to introduce you to modern instrumentation and research topics. The class will be broken into three groups and you will rotate between experiments. Scheduling of topic C may occur outside normal lab times in order to accommodate research/instrument schedules. Final reports for special topic labs will be due on 1st December.

Special Topic A: Synthesis of CsPbX₃ Perovskite Nanocrystals via Organometallic Methods and Observation of Wide Color Gamut via Halide Exchange.

Special Topic B: Research Instrumentation Demonstration – Atomic Force Microscopy & powder X-ray Diffraction (AFM & XRD).

Special Topic C: Research Instrumentation Demonstration –Transmission Electron Microscopy (TEM).