

CHM2045L GEN CHEM I LAB

SUMMER 2024; CLASS #10501, 19221

COURSE COORDINATOR INFORMATION

Instructor	Email	Phone	Office Location & Hours
Mrs. Veige	Email in Canvas only melveige@ufl.edu	392-0518 (email preferred)	Office hours will alternate between Zoom/in person, see Canvas for information W 10am-12 pm Office is SFH 103

LAB MANAGER

Candace Biggerstaff. She can be contacted via Canvas email.

TEACHING ASSISTANT

To be assigned prior to your first scheduled lab session in SFH 110. You will meet your TA at the first scheduled lab session and they will provide you with their preferred methods of contact.

COURSE FEES

Materials & Supplies Fee: \$30.00

GENERAL INFORMATION

REQUISITES

CHM2045L is to be taken with CHM2045. Detailed prerequisite information and credit suitability can be found in the Undergraduate Catalog.

COURSE DELIVERY

This course is delivered 100% face-to-face. All lab meetings occur during your scheduled lab time, at the start of the block of time. You can only attend at your scheduled time - please check your schedule at ONE.UF.

COURSE DESCRIPTION AND GOALS

As both a general education requirement and major's course, CHM2045L is designed to introduce you to common laboratory techniques and equipment used in the general chemistry laboratory, to help you gain understanding and proficiency in their use, and help you explore the process of doing experimental chemistry, and to illustrate representative examples of the useful and important concepts you are learning in the CHM2045 lecture.

By the end of this course, students will be able to apply the scientific method, to collect data and perform calculations, to create and analyze tables of data and graphs of various forms, and to analyze experimental error. Students will be able to refer to literature data and will acquire library skills. Students will be able to use a variety of laboratory glassware and equipment safely, and will be able to handle chemicals safely. Students will learn fundamentals of safety in an academic laboratory setting.

Specifically, students will be able to:

1. Safely handle, use and dispose of chemicals, identify chemical hazards and risks, and use databases to locate chemical safety information.
2. Apply the scientific method and demonstrate proper and safe use of lab equipment and proficiency in relevant techniques to conduct experiments, and to work effectively in small groups and teams.
3. Describe the importance of ethical and responsible conduct in a laboratory setting.
4. Design, construct, and interpret data tables and graphs accurately to communicate experimental findings.
5. Perform accurate and precise quantitative measurements, analyze data statistically and assess reliability of results.
6. Communicate scientific findings and demonstrate scientific reasoning effectively in written form

GENERAL EDUCATION OBJECTIVES AND LEARNING OUTCOMES

Primary General Education Designation: Physical Sciences (P) ([area objectives available here](#))

A minimum grade of C is required for general education credit. Courses intended to satisfy the general education requirement cannot be taken S/U.

Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

The course objectives align with the UF General Education student learning outcomes and physical science area learning outcomes:

General Education SLO	Physical Science SLO	Course Objective Alignment	Assessment
Content	Identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant	Objectives 1-6	All assessments offer opportunities for students to demonstrate content knowledge.

	processes that govern biological and physical systems.		
Critical Thinking	Formulate empirically-testable hypotheses derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.	Objectives 1-6	All assessments offer opportunities for students to demonstrate critical thinking skills.
Communication	Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.	Objective 3-6	Post-lab notebooks, during-lab assignments, post-lab assignments.

LEARNING OUTCOMES AND TECHNICAL SKILLS

A complete list of student learning outcomes and technical skills is posted in Canvas, organized by laboratory experiment.

FIRST DAY OF LAB

Lab commence meeting at your scheduled time after drop/add; Friday students will meet in person in the lab May 17, while Tuesday students will commence meeting May 21. You have assignments due in Canvas May 16 (everyone) - check Canvas for details. On the first day of lab, you will meet your TA and fellow classmates, and complete the first scheduled lab activity. You are not permitted to enter the lab without proper attire, including approved eye protection. Prior to attending each lab period, you must familiarize yourself with the lab background and procedure and complete the pre-Lab quiz and submit your pre-lab notebook in Canvas; these assignments cannot be turned in after their due date/time for credit. Each workstation in the lab is equipped with a computer that allows access to eLearning to view the lab documentation, and to UF Apps.

Your attendance is recorded during the lab period. During or after the lab period, you will submit your during- and post-lab assignments in Canvas for grading. During lab assignments are due prior to the end of your lab time/day; note that if the lab activity is finished early and your lab group and TA depart the lab, you are not permitted reentry to submit the during lab assignments. During lab assignments cannot be turned in late. Post lab assignments are due at 11:59 pm the night following your scheduled lab day; these assignments can be turned in late for reduced credit (-25% per day late). If you are marked absent by your TA or fail to complete the attendance quiz during the allotted time at the start of lab you are not permitted to turn in the post lab assignments and forfeit the grades. Students are not permitted to enter the lab after the first 15 min of the lab period and are considered absent.

COURSE MATERIALS AND SAFETY

REQUIRED MATERIALS/GOGGLES/ATTIRE

- You require a suitable laboratory notebook. Our recommendation is a standard composition notebook. Electronic devices are not suitable for notetaking.
- All UF students are expected to satisfy the UF computing requirement and have access to a computer with an internet connection. You also require Excel.
- Department approved safety glasses/goggles, required for the first day of lab. These must be worn prior to entry and at all times while in lab. Suggestions are here: <https://otl.chem.ufl.edu/safety-glasses/> .
- Proper attire:
 - Shirt: loose fitting, covers whole back, torso and abdomen with raised arms, sleeves cover shoulders
 - Pants: full length (no shorts, capris, cropped pants), no leggings, no holes/rips, skin should not be visible at ankle.
 - Shoes: close-toed and cover whole fit, no holes (i.e. not Crocs)

Safety is our priority. Anyone without the necessary safety glasses, or who is inappropriately attired, will not be allowed into the lab. No gum chewing or headphones are permitted. If you are asked to leave the lab due to improper attire, you will not be permitted a makeup. You can leave and return as long as you return within 15 min of the start of your lab period.

SAFETY

You are responsible for reviewing the safety information provided in Canvas. All of the activities worth credit for the course will be locked in Canvas until you satisfactorily complete the Safety Contract.

LOGISTICS/CLEANLINESS

You will work in pairs to complete the laboratory activities. You should check your group's glassware for cleanliness before beginning the lab. If any glassware is broken during the lab session, communicate this immediately to your TA so it can be replaced/cleaned up.

LAB SCHEDULE (SUBJECT TO CHANGE)

DATES	TUESDAY	FRIDAY
May 13-17	DROP/ADD	DENSITY
May 20-24	DENSITY	HYDRATES

May 27-31	HYDRATES	STOICHIOMETRY
June 3-7	STOICHIOMETRY	MOLAR VOLUME
June 10-14	MOLAR VOLUME	CALORIMETRY
June 17-21	CALORIMETRY	ELECTROLYTES
June 24-28		
July 1-5	ELECTROLYTES	BEER'S LAW
July 8-12	BEER'S LAW	NO LAB
July 15-19	NO LAB	KINETICS
July 22-26	KINETICS	LEWIS
July 29-Aug 2	LEWIS	HEATING/COOLING
Aug 5-Aug 9	HEATING/COOLING	

This lab schedule is subject to change; students should keep their schedule free during their scheduled lab period throughout the semester. Flex days may be used if regularly scheduled lab days need to be rescheduled. Such situations will be clearly announced via Canvas Announcements. It is the students' responsibility to read the Canvas announcements.

Final Lab Exam date Aug. 5, will be in the evening 7-9 pm.

ATTENDANCE INFORMATION

LAB PERIOD

You are expected to attend lab in person during your scheduled lab period, and to leave the laboratory prior to the end of your lab period ends. Everyone is given the same amount of time to complete the experiments. If you are well-prepared, you should not experience difficulties completing the experiments within the allotted timeframe. You may not arrive early, stay late, or attend during a different lab period to complete your laboratory activities. If you are more than 15 min late, you will not be allowed to enter lab and will forfeit attendance points for the day. Any student who has an unexcused absence is not allowed to submit any post-lab assignments related to the missed lab period.

ABSENCES

Requirements for class attendance in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

Excused absences are for extenuating circumstances only: documented illness, family emergencies, or university approved absences. Travel, non-emergency doctor or dentist appointments, or extracurricular activities do not justify an excused absence. Excused absences are not granted for exams or makeup exams for other classes. Missing lab due to improper lab attire does not qualify for an excused absence. Emailed requests to “preview” excused absences are ignored; it should be clear what constitutes an excused absence.

Students who miss lab due to extreme circumstances beyond their control should submit an Absence Request Form in Canvas within 7 d of the missed lab session. To have a request considered for approval, you must (1) complete the Absence Request Form on Canvas; and (2) provide documentation by either attaching a doctor’s note to the form (if due to illness) or request an excuse note from the Dean of Students Office (if due to a family emergency).

Pre-lab assignments for missed labs, even if excused, are due as scheduled since they are available in advance - do not wait until the due date to complete them. A DSO excuse note for the two days prior to the due date is required if these assignments are missed due to illness/emergency.

Students who miss lab (excused or not excused) are responsible for the material.

Any student who missed more than two lab sessions (excluding religious observances, disability related absences, or military leave), whether excused or unexcused, will receive a grade of E in the course.

GRADING

DEADLINES (VARIES PER ASSIGNMENT TYPE) AND LATE POLICY

You will have a partner for lab, but all assignments are completed individually, and submitted and graded individually. Each student must submit each required assignment to receive a grade. While you collect data, make observations, and work on activities with your partner, it is required that you submit your own work. Do not submit a copy of your lab partner’s graph, for example; this is considered copying and is counter to the Honor Code. All Honor Code violations are reported.

The first assignments for the course are due in Canvas on May 16 at 11:59 pm EST. The remaining lab activities will be locked on Canvas until the Safety Contract is submitted. If you miss any assignments due to not completing the contract, you forfeit the grades.

Each week you will have pre-lab assignments, during-lab assignments, and post-lab assignments. The pre-

lab assignments are due at 8:00 am the day of your scheduled lab period and cannot be turned in late for credit. During-lab assignments are due during your scheduled lab period; these assignments cannot be turned in late for credit. All other lab-related assignments are due by 11:59 pm the day following your scheduled lab period. All deadlines are in EST.

Each lab consists of the following assignments whose weight varies according to point value and follow the deadlines above: pre lab assignments (pre lab quiz, safety quiz, pre lab notebook); during lab assignment (graph or photo); post lab assignments (post lab notebook, other).

For best performance, use only Firefox or Chrome for quizzes. Make sure you start well in advance of the deadline.

Post-lab assignments that are submitted late will be penalized automatically 25% credit per day that they are late. The penalty is applied even if the submission is received by Canvas one second past the 11:59 pm deadline, so be mindful of time. Emailed assignments are not considered for grading.

We highly recommend you submit assignments early and verify they've been submitted through Canvas. We do not recommend using the Canvas App to submit assignments - use a web browser to avoid issues. If you encounter technical issues, you can contact the Help Desk at 352-392-4357.

ASSIGNMENT DESCRIPTIONS/TIME COMMITMENT

Syllabus Quizzes are designed to assess your knowledge of the content of the course syllabus. The syllabus does contain a lot of information, and you can refer to the syllabus when needed.

Pre-Lab Quizzes are designed to assess your knowledge of the background information for each lab activity. Questions include multiple-choice questions of content and calculation based questions similar to those you will perform during or after the lab.

The **Pre-Lab Notebook** is designed to assess your preparedness for each lab activity and familiarity with the safety of chemicals used, knowledge of procedural steps, or readiness otherwise (calculations performed, data looked up in a reference, etc.).

Preparation/pre lab assignments typically involve <30 min of video instruction and 2-5 p reading and can all be completed within 90 min for students who have completed or are enrolled in the corequisite course (CHM2045 lecture).

During-Lab Assignments are generally of two types: a picture/photo of an experimental set-up or artifact from the lab, or a graph prepared while in lab. They are designed to ensure you complete tasks when instructed to do so, and while your TA is present to assist if needed (with a graph, for example). Each has a detailed grading rubric to guide preparation of your submission.

The **During-Lab Attendance Quiz** is due within the first 20 min of the scheduled lab period and must be completed in the lab from a lab workstation. The attendance quiz counts as part of the during-lab assignment grade category. If you fail to complete the quiz within the first 20 min you can complete it later during your lab period only, but will incur a late penalty of 25%.

Post-Lab Notebook assignments are .pdf scans of your laboratory notebook. You can write more than is

required in the grading rubric for each but each lab has specific requirements, so refer to the grading rubrics each week. You will record observations, make calculations, you may write abbreviated procedural steps, discuss sources of error, and make tables of data and sketch experimental set-ups in your lab notebook.

Surveys may be part of educational studies or may ask you about specific aspects of the course or for an evaluation of your TA near the end of the semester.

Safety Quizzes are designed to assess knowledge of safety terms, pictograms, and other safety information we cover each week. Also included in the 'Safety' category is the **Safety Contract**, which is an acknowledgement of general safety considerations for the lab, specific safety information related to our general chemistry lab, and familiarity with portions of the *American Chemical Society's Guidelines for Chemical Laboratory Safety* (a document is provided for you to review throughout the semester).

Other post-lab assignments may include Discussions or Assignments in Canvas. Each is associated with a specific lab activity and with specific lab-level student learning outcomes specified in Canvas.

During- and post-lab assignments are designed to be completed during the allotted lab period.

EXAM

A multiple-choice lab exam will be administered during our scheduled final exam time. The final exam is an individual summative assessment of the student's knowledge of content, ability to apply knowledge and make inferences, interpret tables and graphical representations of data and critically analyze information.

Bubbling errors will not be negotiated. A 5 point penalty will be applied for failure to bubble in a UFID correctly or not taking the exam in the assigned room. A 30 point penalty will be applied for failure to bubble in a form code or the wrong form code or for using a writing implement that cannot be scanned (e.g. a pen).

Exam absences will be handled in accordance with official UF academic regulations. For more information, see <https://catalog.ufl.edu/UGRD/academic-regulations/> . See below for further clarification for two different types of situations.

(1) Conflicts with other events: Such reasons may include religious holidays, military obligations, special curricular requirements (e.g., attending professional conferences), or participation in official UF-sanctioned activities such as athletic competitions, etc. For more information on such absences see the official UF Policy at <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/#absencestext>). If you must be absent for an exam due to a documented and approved conflict known in advance, you must e-mail your instructor (within Canvas) the documentation at least one week prior to the scheduled exam and an early conflict exam will be scheduled for you (***before*** the regularly scheduled exam date/time).

(2) Missing an exam due to an emergency or sudden illness: If you are absent for an exam due to an unpredicted documented medical reason or family emergency, you must contact the instructor as soon as possible, and you may be asked to have your excuse verified by the Dean of Students Office (DSO). Your instructor will follow UF academic regulations in evaluating the notification and/or documentation received from you or from the DSO on your behalf. Once your instructor is satisfied with the validity of your exam absence a make-up exam will be scheduled after a reasonable amount of time, i.e., before the end of the semester. If your documentation is deemed insufficient to excuse your absence you will receive a zero on the missed exam.

GRADE BREAKDOWN

Each laboratory exercise is comprised of a pre-Lab quiz, a notebook grade, a post-Lab exercise, and various other assignments specific to that lab. Each lab exercise as a whole is weighted equally to your final grade. Within each lab exercise, assignments are weighted according to the published point value. If there is any confusion about this, please see me. Detailed information regarding each of these grading items is provided in Canvas. Please refer to the catalog for [UF grading policies](#) for assigning grade points.

Assignment weights are as follows:

Assignment Group	Weight %
Safety/Surveys/Syllabus	10%
Lab Assignments (10 @ 7.5% each)	75%
Lab Exam	15%

Grade scale (note: there is no rounding to your score in Canvas):

Letter	A	A-	B+	B	B-	C+	C	D+	D	D-	E
Cutoff	93.0	90.0	86.0	83.0	80.0	76.0	70.0	66.0	63.0	60.0	< 60.0

RE-GRADES

Communicate any lab notebook grade disputes to your TA, either via comment in Canvas, by email, or during the next lab period, and your TA will address your concerns. Requests for grade review must be made within 7 d of a grade being assigned in Canvas. Assignments must be scanned and submitted to Canvas to the relevant assignment in order for points to be considered toward your course grade. Most assignments require submissions in .pdf format.

Regrades of assignments submitted through Canvas, typically via file upload, must be requested within 7 days of a grade being assigned, and should be directed to your TA. If there was a technical issue with the file that was submitted on Canvas, the file can be resubmitted via the comments section to be regraded, but the assignment will suffer a 50% penalty. Technical issues are the student's responsibility so it is recommended that you check your submission when you upload it on Canvas.

Please note all manual grades are tentative for approximately 3 weeks from grading until reviewed by the head TA and/or instructor for adherence to course policy and the grading rubrics. Any grade changes are described in a 'comment' on the student's submission.

EDUCATIONAL RESEARCH STUDY

This semester, CHM2045L is part of a chemical education research study within the Department of Chemistry and the College of Education at UF, investigating persistence in STEM fields among students enrolled in our undergraduate lab courses. The study includes three surveys, the first of which includes an Informed Consent question.

To participate in the study, students will agree to the Informed Consent Form as part of the first research survey by the survey due date. If you do not wish to participate in the study and have your survey data removed from the collected data, you still must complete the three surveys. We do ask you to participate in

the study since the data collected may prove valuable. Please note that you will have to complete all three surveys prior to their due dates to earn a portion of your course grade; these surveys are included in the Survey category in your gradebook. Participation does not influence your course grade in any way.

UNIVERSITY POLICIES

STUDENTS REQUIRING ACCOMMODATIONS

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting disability.ufl.edu/students/get-started. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida. The following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.”

CAMPUS RESOURCES

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the [Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the [Student Health Care Center website](#).

University Police Department: Visit [UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the [UF Health Emergency Room and Trauma Center website](#).

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

ACADEMIC RESOURCES

E-learning technical support: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

[Career Connections Center](#): Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

[Library Support](#): Various ways to receive assistance with respect to using the libraries or finding resources.

[Teaching Center](#): Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

[Writing Studio](#): 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the [Student Honor Code and Student Conduct Code webpage](#) for more information.

On-Line Students Complaints: View the [Distance Learning Student Complaint Process](#).

FEEDBACK

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

NETIQUETTE

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. A detailed guide is posted under the *Settling In* section in Canvas.

GETTING HELP

For issues with or technical difficulties with Canvas, contact the UF Help Desk: <https://lss.at.ufl.edu/help.shtml>; (352)-392-HELP.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for Counseling and Wellness resources, disability resources, resources for handling student concerns and complaints, and library desk support.

CONFLICTS




If you experience issues with CHM2045L that you cannot resolve with your TA, please see Mrs. Veige in person. Don't wait until the end of term to resolve an ongoing issue.

DISCLAIMER




This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

SAMPLE GRADING RUBRICS

Pre-Lab Notebook (sample)

Density Pre-Lab Notebook				  
Criteria	Ratings			Pts
Basic Information	1 pts Full Marks The student labels a page with the name of the experiment, the date performed, and the notebook page number.	0 pts No Marks The student does not provide the required information in full.		1 pts
Materials List	2 pts Full Marks The student provides a complete list of materials for the lab according to the video.	1 pts Partial Marks The student omits 1-2 items from the materials list.	0 pts No Marks The student does not provide a complete materials list.	2 pts
Standard Densities	2 pts Full Marks The student records density values for all 5 metals required, using the CRC Handbook.	1 pts Partial Marks The student omits 1 standard density value.	0 pts No Marks The student omits two or more density values, does not provide units, or the data is erroneous.	2 pts
				Total Points: 5

TA Recorded Attendance

In-Lab Attendance			  
Criteria	Ratings		Pts
Student Presence in Lab	1 pts Present Student present in lab.	0 pts Absent Student not present in lab.	1 pts
			Total Points: 1

Post-Lab Notebook (Sample)

Density Post-Lab Notebook



Criteria	Ratings			Pts
Solid Metal	2 pts Full Marks The student shows full calculations of density and % error of the solid metal.		0 pts No Marks	2 pts
Standard Solutions	2 pts Full Marks Student shows calculations for the density of the standard solutions.		0 pts No Marks	2 pts
Unknown Solution	2 pts Full Marks Student shows calculations of the density and average density for all three portions of the unknown solution. Student calculates the mass % of the unknown solution and calculates the % error.		0 pts No Marks	2 pts
Sources of Error	2 pts Full Marks Student discusses 3 relevant sources of error and categorizes as random or systematic.	1 pts Part Marks Student includes only 2 sources of error and categorizes as random or systematic.	0 pts No Marks	2 pts
Impact of Errors	2 pts Full Marks The student describes how all 3 sources of error would impact experimental results and proposes ways to minimize them.	1 pts Part Marks The student explains affect and how to minimize two of their sources of error.	0 pts No Marks	2 pts
Table of Group Data	2 pts Full Marks Student includes table of group data (at least 6 entries) for unknown solution.	1 pts Part Marks Student tabulates only 4-5 entries.	0 pts No Marks	2 pts
Std Deviation	2 pts Full Marks Student calculates mean, range, and standard deviation of group data.	1 pts Part Marks Student calculates two of the three values.	0 pts No Marks	2 pts
Accuracy and Precision	1 pts Full Marks Student discusses accuracy and precision of single data point vs pooled data.		0 pts No Marks	1 pts
Total Points: 15				