

Chemistry 499 Introduction to Teaching Chemistry Lab

Fall 2016

Welcome to Introduction to Teaching Chemistry Lab. In this course, the student will obtain hands-on experience in teaching Chem 171, Intro to Experimentation (a freshman chemistry lab course) and develop the skills to write a new experiment. The purpose of the course is the development of teaching, supervisory, and communication skills needed by professional chemists. It is by invitation only. This handout provides information concerning lab policies and procedures. You are responsible for all the information that follows. The 499 student is referred to as the 171 teaching assistant, TA.

LEARNING GOALS

1. Development of teaching, supervisory, organizational, and communication skills by teaching Intro to Experimentation (01:160:171):
 - Adherence to Safety Regulations
 - To teach the practical aspects of the fundamental concepts of chemistry taught in first year chemistry courses in a lab environment including:
 - Use of Standard Lab Equipment & Glassware (Analytical Balances, Burets, Pipets, Bunsen Burner)
 - Measurement of Physical Properties of Matter
 - Separation Techniques
 - Application of Gas Laws
 - Determination of Empirical Formulas
 - Titrations for Evaluation of Unknowns
 - Chemical Reactivity
 - Calorimetric Measurement
 - To mentor the 171 Students in Interpretation of Graphical and Tabular Data
 - To cultivate creative, critical, and reflective thinking in 171 students
 - To develop teaching, supervisory and communication skills needed by professional chemists both in academia and industry
 - To put into practice the experience of this pedagogical practice by designing an experiment not covered in 171

Assessment of 499 Students

An integrated approach to assessing the achievement of the learning goals 1 and 2 will be used. This includes the successful weekly teaching and management of grades for Intro to Experimentation, observation of the prelab talks, feedback from students, follow-ups on make-ups, TA substitutions and the design of a new experiment that could be used in the course.

Course Coordinator:

Michael Vitarelli mvitarel@rci.rutgers.edu (848) 445-7439 (Wright Rieman 126)

I'll also be in 002 or 006 in Beck

Stockroom phone numbers: (848) 445-2318 (Beck-LIV)
(848) 932-9319 (CHEM-D/C)

You should all sign up for a training session. Training starts the week before the scheduled experiments. Your **detailed instructions** for the experiments, and keys for prelabs are posted on Sakai on a weekly basis under Resources. Please consult the instructions. The following is only a summary to get you started:

1. **During week one**, you will go over the syllabus for Chem 171 with the students. Refer to the syllabus for Chem 171. The Roster is available on Sakai or can be provided to you separately. Please take attendance and keep track of the students who are late. A hard copy of the syllabi are available from the Stockroom. Make sure you go over the safety rules and significant figures. Remind students to bring a padlock (combination or otherwise) for the next lab. Administer the safety quiz. The Safety Quizzes will not be returned to the students. The students must obtain a score of 80 percent or higher. If the students do not obtain a score of 80 percent or better, they must retake it. No student will be allowed to start experiments with a score less than 80.
2. **During week two**, your students will check in their lab drawers and take the skills test. Assist the students with the balances and the burets. The skills test is available from the Stockroom. The lab manuals, goggles, and lab coats will be provided by the Stockroom during week 2. If you don't have a lab manual, please take one from the Stockroom.
3. **Making up a lab**, No make up labs this semester! The course is filled.
4. **Syllabus for Chem 171**, make sure you study the syllabus for Chem 171 thoroughly. There are a total of 1000 points for Chem 171. This is the breakdown of the points:

25 points for the Skills Test; 26 points for check-out

11 labs, each worth 54 points (24 points for the prelab and 30 points for the postlab), total of 594 points

11 chemical hazard awareness forms, each worth 5 points, total of 55 points.
(Remind students that the chemical hazard awareness form has to be turned in at the beginning of the lab; the form is the same for each experiment and is available for each experiment both in the lab manual and also on Sakai.)

300 points for the final, the final is multiple choice.

Instructor's/TAs Responsibilities for Teaching Chemistry 171 (TAs must arrive 30 minutes early before each lab starts.)

- 1. Lab Training:** Each TA who has not taught the course before is required to undergo lab training provided by a head TA each week. The training starts a week before the actual experiments. You are always welcome to attend a training if you need a refresher for the whole semester or for a particular experiment. The responsibilities of the head TAs are attached for your convenience.
- 2. Primary Responsibility:** Your primary responsibility is to help the students learn chemistry-both technique and theory. You are strongly encouraged to use your own initiative as long as you stay within our guidelines. You are not babysitters and you must do more than merely show up at the assigned times. You should learn the capabilities of each student in your section. Walk around and talk with your students. Make sure you are aware of the students that are absent or are late. Note the names of the students that are making up a lab in your section. Keep track of the prelabs, chemical hazard forms, and lab reports that you collect. Make notes of what they do right and what they do wrong (see record keeping). You must arrive on time. That means that you must be in the lab, write appropriate information on the blackboard and prepared to talk at least 30 minutes before the doors open. Arriving 30 seconds before the lab begins is **unacceptable!**
- 3. Stockroom Personnel:** The Stockroom personnel are responsible for the equipment in the labs, the management of the physical facilities, the times when students and TA have access to the rooms and stockrooms, the assignment of locker space, and safety. You are responsible for teaching chemistry, the conduct of your students, and their safety. You must coordinate with the Stockroom personnel regarding information we have left for you (syllabi, make-up labs,, last-minute changes to the labs), timing for filling unknowns, etc. It is not the Stockroom personnel's job to teach the course.
- 4. Prelab Talk:** You will give a short talk at the beginning of each lab. Before you start the short lecture, make sure all the students are gathered around the blackboard. Do not allow students to be opening their lockers when you are talking. **TAKE CONTROL OF THE LAB.** You should discuss a) how students did on the previous experiment, explaining any obvious errors (very quickly); b) any announcements, such as make-ups in case of inclement weather; c) the theory and practicalities of the new experiment; and encourage students to come to office hours if they need assistance. We will give you suggestions for the material to cover for each experiment. It is important that you cover everything, because the students need to understand these points to have a meaningful experience in the lab. The students will be tested on both the experiments and the concepts behind the experiments. Tell students to study any relevant general chemistry textbook to understand the concepts. Explain the concepts when appropriate so that the students are not just following a recipe. In the event the material has not been covered in the lecture, spend an extra few minutes to convey the concept. Use lots of demonstrations (where appropriate).
- 5. Safety:** **You are responsible for the safety of your students.** Enforce all safety rules. **You must also adhere to all safety rules.** That especially means the wearing of regulation safety goggles during the entire lab period. You cannot wear a different kind of safety glasses. The stockroom personnel are authorized to remove anyone not obeying basic safety rules, after warning them. That includes TAs. You are a role model for your students. If you do not wear personal protective equipment (goggles), the students never will. Wear the safety goggles over your eyes for the entire period. Do not wear the goggles on your forehead. Failure to maintain a safe environment for the students is of paramount importance. Do not grant exceptions to the dress code just because you think it is safe. Be watchful of

students bringing food and/or drink into the lab. This includes water bottles. You should report any violations of this policy, or indeed any perceived safety violations or hazards, to the course coordinator. Note your concerns will be handled discretely and anonymously.

6. **Emergency:** In the event of an emergency, be calm. Safety first. Call 911 or have someone call 911. Get the students away from any unsafe condition. Get help if you need it. The stockroom personnel can help in almost any situation. If you must evacuate the lab, make sure you know how many students got out. Designate a gathering place outside the lab in case of an emergency.
7. **Lab Logistics:** The labs start and end on time. The stockroom personnel will unlock the doors and invite the students in, when the period starts. **You** are responsible for managing their time. **No work (use of equipment or chemicals) is allowed during the last 15-30 minutes of class.** You (and the stockroom personnel) decide when clean up should begin. If the lab requires a lot of equipment and materials, leave more time for clean up. When the stockroom personnel say it's time to turn in equipment, it's time to turn in equipment. When the stockroom personnel say it's time to leave, it's time to leave.
8. **Housekeeping:** Keep the lab clean and usable. It is your responsibility to leave the room clean and usable by the next section. The students **should** clean up after themselves, but if they don't, then you must. You may penalize students who do not clean their areas (see record keeping). Make sure the sinks are not blocked. During the lab period, make sure the students have enough materials and that the balances are operating. Report any problems or malfunctions to the stockroom personnel. If you are running out of chemicals, it is because the students are taking too much. Take steps to prevent this from happening. Assess such things as basic understanding of the experiment, general lab skills, degree of preparedness, tidiness of the work area, handling of chemicals and wastes, and cooperation in following instructions.
9. **Data Keeping and Lab Operation:** Many of the labs will take all the time the students have. Students who are not prepared will run out of time. You must push the students along to help them finish on time. You may not give students extra time to complete the write-up. At the same time, do not rush the students to finish early; remember even if it is a short lab, the students can stay the entire period to ask questions. All papers must be turned in to you by the end of the 3-hour lab period. Students should write their data directly on the data sheets. These are to be treated as a lab notebook. Penalize students if they write it on scrap paper and later transfer it to the sheet. Penalize them if they use correction fluid. Keep track of all the lab reports that are turned in.
10. **Students with Disabilities:** Some students have special needs due to documented disabilities (Dyslexia, ADD, etc.). They must turn in a letter documenting the disability. Generally, such students are allowed time and a half for tests. They may turn in the completed data sheets at the end of the period and arrange a time each week either with you or the stockroom to spend one additional hour performing calculations and writing answers. **No student may take the data sheets home.** Consult the coordinator if you have a student with a disability.
11. **TA Substitution:** It is your responsibility to find a substitute. If you are ill or cannot make it to a lab for a legitimate reason, arrange for another qualified TA to replace you and inform the stockroom personnel and the coordinator as soon as possible. You can then cover their section. If you have a conflicting engagement that you know of at the beginning of the semester, please find a substitute and let us know. It is your responsibility to find a TA to cover your section. Provide the appropriate documentation to the coordinator.

12. **Academic Integrity:** Refer to the website for academic integrity information:

<http://academicintegrity.rutgers.edu/>

The University's policy on Academic integrity can be found at:

<http://academicintegrity.rutgers.edu/academic-integrity-policy>

Violations of Academic Integrity by 171 Students

Most of the violations you will notice are level two or higher. Level one would be working together on some post-lab questions (we tolerate some helping) after being asked to work independently. An example of level two might be two students turning in nearly identical lab reports, such that it is obviously only one student's work. The most serious violations you are likely to see are level three. These could include a repeat offender for a level two violation, turning in a lab report from a previous semester, copying from another student during the final, or other very serious breach of ethics. In all cases of suspected violation, consult with the coordinator for advice on how to handle the situation.

Professionalism as demonstrated by you

Since you are placed in a position of authority, you cannot share information with the students in your section or other sections who happen to be your friends or to be popular with the students. The list of unknowns and TA material is for your use only and you need to keep all of them in a safe place. **Any violation is considered violation of academic integrity.**

13. **Record-Keeping and Grading of 171:** Allow enough time in the week to prepare unknowns before lab. Make arrangements with the Stockroom personnel. Use as many different unknowns as you can. Do not give each student in your section the same unknown unless instructed to do so. Keep a record of the unknowns. You must grade the reports/chemical hazard forms in a timely fashion. That means you must return to your students, lab reports, chemical hazard awareness forms back the next time you see them. You must enter the grades in sakai on a weekly basis. **In addition to sakai, keep a hard copy record of all grades for your students in case of problems.** Keep your own separate notes, for example "such student made up the lab in a different section". Do not rely on your own memory.

Remember keep track of grades both on **Sakai and separately**. We always need a backup to the grades.

Grading is just as important as teaching in the lab. Students learn by seeing their mistakes corrected. Make useful notes on the reports that will be helpful to the students. Grading is time consuming, but very important. No one enjoys the time it takes to grade, but it must be done and you can learn from grading. Teaching is not a popularity contest, and you don't get rewarded for having a higher average in your section. In the end, you'll save yourself time and hassle if you grade correctly the first time. Below are a few hints that may make the job a bit easier. We will be using an online record keeping system, but you should keep your own records. Do not rely on the online system alone. Keep the grades in more than one location. Keep a hard copy. Below are some General guidelines and Frequently Asked Questions and Answers. Specific instructions will follow later.

14. **Proctoring of Exams:** You are required to participate in proctoring of exams and any possible grading that may be required.

General Guidelines for Grading Chem 171

- a) **Be consistent.** The same rules have to apply to all the students in the course. There are always judgment calls, and the same paper graded by two different people will receive different scores. We try to minimize this by giving you detailed grading schemes. Follow them. Do not just give the entire section a grade of “40” and be done with it. The simplest way to maintain consistency is to grade the entire section at one sitting. That way you'll remember what you did to other students when you get to the bottom of the pile.
- b) **Be fair.** The reports should be graded on the merits of what is written, not your memory of whether the student causes problems. Do not look at the name on the paper until you've finished grading it. Follow our grading scheme
- c) **Maintain all records carefully and securely.** Each student's grades are confidential. If a student wishes to disclose his or her scores, the student may. You may not. If there is a question about a student's grade, we must be able to justify it from your notes and records.
- d) **Record the scores and changes to the scores** promptly. Enter grades in Sakai each week before lab begins. Also keep track of your grades in a separate place as hard copy. We need to ensure that you are grading appropriately and fairly. Keep track that the score was changed.

Frequently Asked Questions and Answers

(Always have your own record independent of Sakai)

Question 1- How do I keep track of Attendance on Sakai?

Answer 1 = present; 0.5 late; 0 = absent

The 1 and 0 scores for Attendance do not count in the total, it is only for record keeping, that is why the Attendance is in italics. So students who have made up the lab do not need to worry that there is a 0 for Attendance since we have the grade for the lab that they made up in a different section. 0 means they were absent on their scheduled lab date.

Question 2 - If a student missed a lab but made it up at a later date, should he or she receive a 0 or a 1 in the attendance value on Sakai.

Answer 2 - Change it to a 1, but put a note that the lab was made up.

Question 3 - If a student missed a lab and was excused for that lab how should the attendance be marked.

Answer 3 - For Attendance, change it to a blank. But put a comment:

For Comments, you put down for example, “John Smith was excused due to illness; medical doc provided”

Question 4 – What should I do if a student gives me a disability form

Answer 4 – Please give the form to Ann in the Chemistry Office (Wright Chem Labs Room 142) and ask her to put it in my mailbox.

Question 5 – What should I tell a student if the student has a conflict with the final?

Answer 5 – Have the student contact me. We will also announce an alternate day for the conflict exam two weeks before the scheduled final exam date.

Evaluation and Grading of 499 Students:

- Personal Compliance with Safety Regulations and Enforcement of Safety Regulations with Students
- Attendance of the Introductory Meeting and other meetings if necessary
- Timely attendance of weekly labs
- Timely Coordination with the Stockroom for Unknown Preparation
- Maintenance of office hours
- Video evaluation of prelab talks
- Timely grading of labs, exams etc.
- Cooperation with coordinator for various aspects of teaching and the assignment of letter grades
- Attendance of all training sessions (for Students taking 499 for the first time)
- Assignment due during the checkout week (for Students taking 499 for the second time):
 1. Design a new experiment for your students, based on the concepts of general chemistry. The experiment should be modeled after the experiments in your lab manual and should have a chemical hazard awareness form, prelab and postlab questions. Also include a cost analysis for the chemicals or any new glassware. Make sure you include all references. Be creative.
 2. Provide a key for the chemical hazard awareness form and for both the prelab and postlab questions.

499 Students with a Disability:

If you have a disability, contact the Office of Disability Services at <https://ods.rutgers.edu/> or call 848-445-6800 and please let us know right away so that we can make the appropriate accommodations for you.

Chemistry 171/499 Head TA Responsibilities

Purpose: The purpose of this document is to clarify the responsibilities of the head TA assigned to Chemistry 171/Chemistry 499.

- 1. Lab Training:** Head TAs are responsible for providing training for the new teaching assistants. Each TA who has not previously taught is required to undergo lab training provided by a head TA each week. The training starts a week before the actual experiments at Beck Labs on the Livingston campus and takes three hours. Three training sessions (subject to change) are scheduled as follows:

Training session 1: Thursdays 10:40 to 1:20 PM BE151

Training session 2: Fridays 10:40 to 1:20 PM BE151

Training session 3: Fridays 2:00 to 4:40 PM BE151

Each head TA can choose one training session per week.

The head TA is required to attend the Orientation meeting with the 499 TA's, and other TA's at the beginning of the semester to obtain additional information or learn of any changes that may be necessary due to the schedule of the 499 TAs etc.... We try to be flexible since the schedule of the 499 undergraduate TAs may change the last minute.

- 2. Primary Responsibilities:** Head TAs have two primary responsibilities: a) to help the TAs gain confidence in teaching a lab and b) to maintain a safe educational environment. For majority of the TAs, it is their first time teaching.

You must arrive at Beck Labs on time. That means you must be in the lab, write appropriate information on the blackboard and be prepared to talk at least 30 minutes before the doors open. Arriving 30 seconds before the lab begins is **unacceptable!**

- Everyone has to follow safety guidelines; no short-cuts to safety procedures will be acceptable.
- You must take attendance at the weekly training sessions; have the TAs sign in the composition notebook available in the stockroom each period.
- Have the TAs run through the experiments like the students.
- Show the TAs the typical mistakes that students make.
- Suggest typical questions that students ask.
- Go over typical pitfalls.
- In addition, please go over the pre-labs and the post-labs. (The pre-labs are questions answered by the students before the start of the actual experiment, they may be electronic or on paper. The post-labs are the calculations performed by the students after they complete the lab with their own data.)
- Ask the TAs to bring their graded lab reports from the previous week and make sure the lab reports are graded according to the keys provided to the teaching assistants, generally posted on the 499 Sakai website.

- 3. Video Taping of the TA's pre-lab talks at Beck/HSB Labs:** You will be videotaping several of the pre-lab talks of the 499 TAs while they are teaching for the purpose of giving them feedback. You can use the TA's cell phone, your own cell phone, or get assistance from Digital Classroom Services for videotaping. Watch for the following:

- Length of the pre-lab talk; roughly 10 minutes or so.
- Legibility and usefulness of the information written on the blackboard.
- Delivery of the talk. Is the TA talking to the students or to the blackboard?
- Command over the lab. Are the students listening or getting equipment from their labs? Is the main concept of the experiment communicated to the students?

You don't need to video tape the whole lab. Since you are already in the lab, you can spend additional time to observe and to take notes. You can observe two TAs at the same time since most labs are next to each other. Concentrate on the following:

- Observation of proper safety procedures; remember students need to be wearing safety goggles at all times including when they go to the stockroom.
- Interaction with students; TAs need to be proactive; it is not acceptable for the TAs to be grading lab reports or checking cell phones during this time period.
- Response to questions.

- 4. Occasional Auditing of the labs:** You will stop by the labs on occasion and observe the TAs and the interactions with the students. Document your visit and your observations in the notebook available in the stockroom in two sentences. See above.
- 5. Substituting for the TAs:** On occasion, the TAs may need a sub due to scheduling conflicts; every effort is made for the TAs to handle it among themselves; however you may be asked to substitute for a TA on a short notice.
- 6. Proctoring and Grading:** You are required to proctor, assist with grading, and proofing of exams. Make sure the TAs have put in their grades on a timely basis. TAs are required to put in 0's for unexcused absences for all the grade items. If the absence was excused, TAs should leave the items blank. Please make sure the prelabs that are graded by eGyan and are left blank are changed into a zero. Look over all the grades of the TAs before the final.
- 7. Miscellaneous:** You may be asked to meet with a TA separately to provide additional guidance; you may be asked to assist with grading; you are strongly encouraged to provide suggestions as how to improve the course; you may be asked to try a new experiment etc....It is an opportunity for you.

EMERGENCY INSTRUCTIONS FOR CHEMISTRY TAS

(Call 911)

In case you encounter an emergency situation while teaching your lab, keep in mind the following guidelines:

1. Stay calm and keep your class calm - don't panic.
2. Ask the stockroom attendant or a student to call 911 for help. Do not leave an injured student alone.
3. If it is necessary to evacuate the lab, do so in an orderly fashion. Group the students outside in a safe area, and do a head count.
4. If a student is seriously cut, put on gloves and apply pressure using sterile gauze and/or paper towels, and if possible, elevate the cut area, unless instructed otherwise by the emergency personnel.
5. If a student faints, first check for other injuries and then cover him or her with a blanket. When the student regains consciousness, move him or her to a safe area where he or she can sit or lie down. In the past some students have fainted due to not eating.
6. If a student is splashed in the eye with a chemical, lead the student to the nearest eyewash and flush the eye with water for 30 minutes.
7. If a student is splashed with a corrosive chemical on the hand or arm, lead the student to the nearest sink and flush the area with water for at least 15 minutes.
8. If a student is splashed with a corrosive chemical elsewhere on his/her body, lead the student to the nearest safety shower. To protect the student's modesty, the TA, stockroom attendant, or a designated student of the same gender should assist the student in removing clothing from the affected area. Ask the stockroom attendant for the blanket from the stockroom, and have other students hold it up as a curtain. Keep the student under the shower for at least 15 minutes.
9. If a student's clothing or hair should catch fire, command them to "stop, drop, and roll." This means the student should immediately drop to the floor and roll so as to extinguish the flames.
10. If a student should burn him or herself from a hot surface, assist the student in placing the burned area under cold water for at least 15 minutes.
11. If a student is to be taken to an emergency room, if possible find out the destination. If appropriate, ask the student to contact the course coordinator as soon as convenient to provide an update on his or her condition.

As soon as possible, the TA or the stockroom attendant should contact the course coordinator and Andy DeZaio at (732) 445-6790 to report the situation.

Remember, be sure to call 911!!!

Acknowledgements: This document is a modification of the original syllabus created by Setareh Marvasti.