# Introduction to Experimentation – Fall 2015 Syllabus

(Note the page numbers refer to the lab manual given to you during the lab unless otherwise noted)

<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: 9/1-9/8</td>
<td>No Labs!!</td>
</tr>
<tr>
<td>2: 9/16-9/22</td>
<td>Safety Quiz(^1) and Check-in (Bring padlock; Study attached Safety Rules)</td>
</tr>
<tr>
<td>3: 9/23-9/29</td>
<td>Density: A physical Property of Matter (p.1) Start of Handing in a hard copy of the Completed Chemical Hazard Awareness Form to your TA (First Online Prelab Questions Due) For this experiment only finish the postlab questions in the lab and turn in the handwritten postlab questions to your TA by the end of the lab period. Beck students: turn in 1 test tube</td>
</tr>
<tr>
<td>4: 9/30-10/6</td>
<td>Paper chromatography. (p.11)</td>
</tr>
<tr>
<td>5: 10/7-10/13</td>
<td>Sakai Posting(^2): Water of Hydration (Print and bring to lab) Beck students: Turn in six 10 mL test tubes in a labeled 100 mL beaker for the Net Ionic Equations Lab.</td>
</tr>
<tr>
<td>6: 10/14-10/20</td>
<td>Net Ionic Equations (P. 23)</td>
</tr>
<tr>
<td>7: 10/21-10/27</td>
<td>Empirical Formula of Copper Chloride (p. 41)</td>
</tr>
<tr>
<td>8: 10/28-11/3</td>
<td>Reactivity of Metals. (p. 81)</td>
</tr>
<tr>
<td>9: 11/4-11/10</td>
<td>Volumetric Analysis: An Acid-Base Titration (p.127) (Save HCl/NaOH for next lab)</td>
</tr>
<tr>
<td>11: 11/18-11/24</td>
<td>Determining Molar Volume of Carbon Dioxide (p. 69)</td>
</tr>
<tr>
<td>12: 11/25-12/3</td>
<td>Enthalpy of Formation of Ammonium Salts. (p. 111)</td>
</tr>
<tr>
<td>13: 12/4-12/10</td>
<td>Check Out(^4) And Sakai Posting(^2): Magnetic Behavior Lab (Print and bring to lab)</td>
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</tbody>
</table>

Saturday 12/19, 10-11 AM **Final Exam:** Sections 1-23 College Avenue Gym Sections 24-48 Collage Avenue Gym “Annex” (Smaller Gym)

## Notes:

\(^1\)Every student must get 80% or better on the safety quiz. Every student must have a thorough and complete understanding of all the safety rules and follow them at all times. Students will not be allowed to work in the lab without first passing and signing the safety quiz.
Welcome to Introduction to Experimentation (160:171). This handout provides information concerning lab policies and procedures. You are responsible for all the information that follows. Failure to comply with the rules contained in this packet can result in a loss of points and a consequent reduction in grade. No appeal will be considered on the grounds that you did not understand the rules.

**LEARNING GOALS AS MEASURED BY PRELABS, POSTLABS, AND OUR ASSESSMENT**

- To explore the principles of chemistry in a safe and environmentally appropriate manner
- To motivate the students to enhance their creativity and problem solving skills in the lab
- To understand the basics of the scientific method by probing, and exploring the fundamental concepts of chemistry
- To hands-on learn and apply the fundamental concepts of chemistry thought in first year chemistry courses including:
  - Physical Properties of Matter
  - Separation Techniques
  - Empirical Formulas
  - Titration
  - Chemical Reactivity
  - Thermochemistry
- To apply the above concepts to problems relevant to general chemistry
- To stimulate the ability to relate the concepts above to each other in ways that were not directly performed in the lab

**Required Items: by week 2**

1. Registration for the lab course: If you are registered, the Department will provide the Lab Manual, Goggles, and Chem Kit. Part of your term bill, if you registered for 171 was a fee that covers the lab manual and the disposable items. **If your name does not appear on our roster, you are not in the course and will not receive a manual, goggles or the rest of the chem kit.**

2. You are required to bring a Pad-lock for your drawer, any lock similar to a bicycle lock, or a gym locker will work. This is to lock up your glassware.

**Description of Course:**

Course Coordinator/Administrator:

- Michael Vitarelli (michael.vitarelli@gmail.com) (848) 445-2618 (Wright Rieman 126)
- Stockroom phone numbers: (848) 445-2318 (Beck–LIV)
  - (848) 932-9319 (CHEM–D/C)

Course website: Sakai
This course is a laboratory course. The grade you receive in chem. 171 is based primarily on your performance during the labs and our assessment tools. You are being graded on technique and accuracy. Occasionally, a student can do all the proper steps in the correct order, and still have bad results. This is usually because of poor technique, but regardless of the reason, we grade on the data you turn in.

Grades and scores will be posted on Sakai.

**Intellectual Property**

The material for this course is copyrighted and may not be posted on any other web site at or outside of Rutgers without permission. Any violation of this policy will be treated as an academic integrity violation and will be referred to the Office of Student Conduct or Equivalent for action.

**COURSE POLICIES**

**1. Laboratory operations**

Before each lab, you must do 2 things. 1. You must read the experiment thoroughly and look up the concepts in any general chemistry textbook. 2. The pre-lab assignment is on-line and will be accessible to you until the start of your lab. The prelab assignment also includes a chemical hazard awareness form that you need to fill out for the chemicals you will encounter in that experiment and what precautions you must take in handling them. You will hand in a hard copy of the chemical hazard awareness form to your TA at the start of the lab. You will perform the experiment after your instructor discusses various aspects of the work, changes in procedure, and any tips. During this time, go to the blackboard and listen carefully to what your instructor is discussing; do not perform any lab related activity during this time. **SAFETY GOGGLES MUST BE WORN PROPERLY IN THE LAB for the entire period**, if any one of the drawers is open. Safety goggles must be worn on the eyes and not on the forehead. **PENALTIES FOR VIOLATIONS WILL BE IMPOSED WITHOUT WARNING**.

**2. Grading**

A total of 1000 points are allocated as follows: skills test (25 pts), 11 experiments (330 pts, 30 points each), 11 pre labs, (264 points, 24 points each), 55 points for chemical hazard awareness, 26 points for check-out and 300 points for the final exam. Also your TA will 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 for the assessment of your grades. **Of the entire class, approximately 20% will get A's; 30%, B's; 40%, C's; 10%, D's or F's.** **Note there are no preset number of points for a particular letter grade.**

Labs are graded largely on performance and outcome, rather than effort. The accuracy of your lab work is of importance.
Distribution of Points

<table>
<thead>
<tr>
<th>Item</th>
<th>Points</th>
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<tbody>
<tr>
<td>Skills test</td>
<td>25</td>
</tr>
<tr>
<td>Experiments (total of 11)</td>
<td>330</td>
</tr>
<tr>
<td>Pre Labs (total of 11)</td>
<td>264</td>
</tr>
<tr>
<td>Chemical Hazards</td>
<td>55</td>
</tr>
<tr>
<td>Check out</td>
<td>26</td>
</tr>
<tr>
<td>Final Exam</td>
<td>300</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

You will **not** need a separate lab notebook. Record all data directly on the data sheet provided in your lab manual and **show all calculations**. All entries have to be made in **permanent ink** (flair pens run and are not acceptable). A single line through the entry can be used to indicate any deletion with your initial —correctional fluid is not allowed. **NO EXTRA TIME WILL BE ALLOWED FOR UNFINISHED WORK**. The key for a lab course is preparation and organization.

Once you check into a drawer you must check out again. If you drop the course, you must check out before the course is over or you will be charged $50.00.

3. Absences:

An unexcused absence will result in a zero grade for the missed experiment; three (3) unexcused absences will constitute an automatic failing grade for the course. Anyone with 3 excused absences will be asked to drop the course and take it another time. A student with 3 or more absences (valid or otherwise) will not pass the course.

For excused absences, an average of completed lab grades will be assigned. According to University policy, regularly scheduled classes take priority over common hourly exams and your other instructor **must** make alternate arrangements. Students who miss lab to take an exam will receive a zero on the lab. **Please understand we cannot excuse you or permit you to make up the lab to take a common hourly exam for a different course during your scheduled lab period!**

Remember you will be standing and working in the lab for three hours and you need to observe common sense (such as sleeping and eating properly before coming to the lab) to avoid incidents. If you are sick or are injured, follow your doctor’s orders and notify the stockroom or your TA by phone or email. We will never punish a student for being ill. While it is in your best interest to perform each experiment, rather than having the grade averaged out, this should not be done at the expense of your health. If you become ill during the lab, let the TA or stockroom personnel know **immediately!** We will excuse your absence if you become ill during the experiment. We will attempt to provide any assistance we can. **Your TA cannot approve any absence. This semester the course is filled there are no makeup labs possible.**
VALID REASONS FOR ABSENCES

Valid reasons include (but are not limited to):
- Religious observance (requires advanced approval)
- Illness or injury (requires documentation)
- Certain Rutgers sponsored activities (requires advanced approval)
- Court dates (requires prior approval)

Reasons that we will NOT excuse for include (but are not limited to):
- Dismissal from the lab due to the violation of safety rules such as dress code
- Vacation plans. Family trips, weddings, or reunions.
- Leaving early for holidays such as Thanksgiving or Christmas
- Non-Rutgers group events
- Job schedule
- Transportation issues/car troubles (accidents on the way to lab with a police report may be excused)
- Child/family care issues
- Personal issues

Please make sure the documentation is provided in the timeframe requested, if the documentation is not provided, the make up will not be counted.

4. Weather and Other Emergencies:

Check the Rutgers website for any information concerning campus operations due to weather conditions or other emergencies. The “Campus Operating Status” can be found at http://nb.rutgers.edu/about-us/new-brunswick-campus-operating-status or by going to the main New Brunswick webpage at http://nb.rutgers.edu. If classes are on schedule, then labs will be held as scheduled. If there is a delay in opening, as long as there are 2 hours remaining for the lab period, students should attend lab for the remaining time. Changes in schedule and other adjustments will be announced on Sakai or by email. Students are still responsible for all the material even if a particular lab is cancelled due to weather emergency.

When announcements are made, campus status information will also be available through:

- Rutgers University Facebook page
- Rutgers University Twitter (@RutgersU)
- RU-info Channel on RU-tv 3
- RU-info Call Center at 732-445-INFO (4636)

For more information about the university's policy concerning adverse weather conditions, please visit http://emergency.rutgers.edu/weather.shtml.

5. Breakage:

When you break a piece of equipment, first clean up the broken glass (placing it in the appropriate disposal container), then go to the stockroom. You will fill out documentation (available in the stockroom) with the requested information including
which item(s) you broke. The cost of these items will be totaled, and at the end of the semester the total will be submitted to the cashier’s office. You will receive a bill for the broken items. **Do not pay the stockroom personnel for broken equipment. You will be billed at a later date.** Any equipment missing from your drawer at check-out will be added to this total. Failure to pay this bill promptly can result in deregistration, withholding of transcripts, and revocation of other privileges the University may deem appropriate.

6. **Students with Disabilities**

   Please contact the office of Disability Services at [https://ods.rutgers.edu/](https://ods.rutgers.edu/) or tel: 848-445-6800 if you need a permanent or a temporary accommodation.

   We attempt to accommodate students with disabilities in an appropriate manner. If you require extra time for assignments, you will need to get a letter from the Office of Disability Services confirming this. Notify the stockroom/your TA and the course coordinators of your disability by the end of the first lab period. Also make arrangements for the stockroom/TA and course coordinator to receive a copy of the disability letter by the end of the first week of classes. Our experience shows the three hour lab period is enough time to perform the experiment for most students since the post lab questions will be performed online at your convenience by the same day due at 11:00 PM. If your disability is such that we feel you would be a risk to yourself or others, we may recommend that you not take the lab at all. If this is the case, we will discuss with you, your Dean, the Office of Disabilities Services, and/or the Departmental administration if waiving a lab requirement is in your best interest. In any event, we are happy to discuss your special needs with you.

7. **Academic honesty**

   You are being graded on the work you perform. Use of lab reports from other students (past or present) is expressly forbidden. Both the lender and the borrower are subject to severe penalties. Some discussion about the labs is acceptable at the discretion of the TA, but you must perform all the work (including the data analysis and answering of questions) yourself. The TA is free to ask you at any point to explain what you are doing. This is to help the TA instruct the confused and prevent copying of answers. If you are confused, ask for help. Don’t just copy an answer.

   The University’s policy on Academic integrity can be found at [http://academicintegrity.rutgers.edu/policy-on-academic-integrity](http://academicintegrity.rutgers.edu/policy-on-academic-integrity)

   We cannot see everything that occurs in lab. If you observe any violations of the rules, you owe it to yourself and your fellow students to report it. We will treat these reports in the strictest confidence.

   Here are some common violations of the academic honesty policy and the penalties that have been assessed in the past:
<table>
<thead>
<tr>
<th>Violation</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing data</td>
<td>Zero on lab</td>
</tr>
<tr>
<td>Possession of previous semester’s lab report in class.</td>
<td>Zero on lab</td>
</tr>
<tr>
<td>(This includes electronic access by any method such as texting.)</td>
<td></td>
</tr>
<tr>
<td>Performing unauthorized experiments (horseplay)</td>
<td>Zero on lab</td>
</tr>
<tr>
<td>Second offence for any of the above</td>
<td>Failure of course</td>
</tr>
<tr>
<td>Posting of material from this course on another website</td>
<td>Referral to the Office of Student Conduct or Equivalent</td>
</tr>
<tr>
<td>Untruthful medical note or documentation for make ups or excuses</td>
<td>Referral to the Office of Student Conduct or Equivalent</td>
</tr>
</tbody>
</table>

In addition to the penalties above, your academic dean will be informed of the infraction. You may be placed on academic probation, suspended, or expelled. Further, record of the violation can impact your ability to obtain professional credentials and/or licenses in the future.

8. **Dropping the course**

   In the event that you drop the course, you **MUST** check out of your drawer. You can go to the lab any time Chem 171 is running on the campus that you took the course. Obviously, it is easiest if you check out when your lab meets.

   Go to the stockroom (if it’s not when your section meets) at the BEGINNING of a lab period and tell the personnel that you are checking out. You must do this before the end of the semester.

9. **Chain of Command:**

   If you have a question about grading, you should first talk about it with your TA. If you are not satisfied with the explanation, you may raise the question with either of the course coordinator. We will not intervene for questions of a small number of points. Decisions made for safety (such as ejection for violation of safety rules) can be made by any TA, the stockroom personnel, or one of the coordinators, or a chemistry faculty member. These decisions are final and not subject to appeal. If you have a question about content, concepts or procedures then you may ask any TA or either of the coordinators for help. Each TA and coordinator holds office hours; this is the perfect time to discuss such matters.

   You must attempt to clear up any concerns you have about the grading of your reports as soon as possible. You have **two weeks** after the end of any given lab to request that its grading be reviewed. The coordinators will not consider appeals after the two weeks are up.

10. **LAB SAFETY RULES**

   1. You are not permitted to be in the laboratory when a TA is not present.
   2. Report all accidents and injuries, no matter how minor, to your TA.
3. You are only allowed to do authorized experiments.
4. Horseplay in the lab is unacceptable behavior and is cause for immediate ejection.
5. **You must wear safety goggles on your eyes (not foreheads) in the lab at all times.**
   - Contact lenses (hard or soft) are not permitted: trapped chemicals may cause injury to the eye.
   - Know the location and use of the closest eyewash, safety shower, and fire extinguisher.

If you get chemicals in the eye, immediately flush the eye with copious amounts of water from the eyewash. For other parts of your body, wash the affected area thoroughly using the sink or safety shower.

6. Keep your book bags and other non-essential items at designated spaces only.
7. Bare feet, legs, or midriffs are not allowed in a chemistry lab. Sandals, open-toed or open-backed and open-topped shoes, shorts, or halters are not enough protection. Legs must be covered completely to within 1 inch of the top of your shoes. If you have long hair it must be tied back. Old clothing or a laboratory apron or coat is highly recommended. **If you are not properly attired, you will not be admitted to the lab.** If you are ejected from the lab for improper dress, you will not be permitted back until you are properly dressed. If you miss the lab, or do not finish, you will not be permitted to make the lab up, and the absence will **NOT** be considered excused. If your back is exposed when you bend over then your top is too short and you will not be allowed to work.

8. The vapors of a number of solutions are quite potent and can irritate or damage the mucous membranes of your nasal passages and throat. If you must smell a chemical, hold its container away from your face and waft its vapor gently toward your face with your hand. For reactions involving poisonous or noxious gases, use the hood by placing the container well within the marked lines. At Douglass, **ALL WORK MUST BE DONE INSIDE THE HOODS!**
9. Always keep burners under the hood. Never apply heat to the bottom of the test tube; always apply it to the point at which the solution is highest in the tube. A suddenly formed bubble of vapor may eject the hot and perhaps corrosive contents violently from the tube (an occurrence called “bumping”).
10. No eating, drinking, or smoking in the lab. You may not bring in anything consumable, either. Water bottles (or other drink containers) are not permitted in the lab, even if they stay in your backpack.
11. Never taste chemicals or solutions—poisonous substances are not always so labeled.
12. Label all containers. Stock solutions must remain on the stock solution bench. Be sure to replace the same cap or stopper on the reagent bottles. Do not put medicine droppers or pipettes in the reagent bottles. Do not take too much stock solution. If you accidentally take more than you needed, do not return the excess back in the reagent bottle, try to give it to another student or dispose the excess as instructed. Grades may be reduced if instructions are not followed and materials are found where they should not be.
13. Although we do not provide gloves, you may wear them, if you choose to do so. Consult with your TA or the stockroom regarding the type of gloves you should consider. All experiments in this course can be safely performed without gloves.

14. Make sure your sink is cleaned out before leaving the lab.

15. Beware of hot glass—it looks cool long before it may be handled safely.

16. You must wash your hands at the end of lab even if you have been wearing gloves. This will prevent you carrying something out on your hands, which you later might get in your eyes or onto food.

17. **Inform your TA if you have a medical condition that requires special consideration.**

**WHEN IN DOUBT, ASK YOUR INSTRUCTOR!**

**Use of Hoods**

We have two types of hoods that you will encounter: a low-flow laminar flow fume hood (called “traditional” hood from here on), and a canopy hood. Each is used in a different manner. You should understand both but know how to use the type of hood you have. Hoods are shared, so be courteous. Both types depend on air flow, so be careful not to block the vents.

**Canopy Hoods (Beck)**

These are older hoods, designed for student use. They are not designed to handle large amounts of very volatile compounds and provide no protection from spills or explosion. Essentially, they are air vents mounted over a portion of the work area. Whenever you are heating material or working with volatile compounds, you must use them.

To use them effectively, place the material inside the lines marked on your work area. The closer you get to the center of the hood, the more effective it is.

**“Traditional” Hoods (Douglass)**

These are newer hoods, and look like what most of us have come to think of as chemical hoods. They are metal boxes mounted on the benchtop. Our hoods have glass panels that slide left and right. In addition, the frame holding the panels slides up and down. They work by drawing air from the room into the box and out the top. They provide complete protection against exposure to volatile compounds under most conditions and, if used properly, provide some protection from spills, fire and explosions. You use them **WHENEVER** you are working with volatile compounds. **ALL WORK SHOULD BE DONE INSIDE THE FUME HOODS.**

To use them, place the material inside the hood (see picture below). You may slide the front up to do this if you need to. Most hoods require that the front be down most of the way. These hoods will operate with the front at any height; however they are designed to operate best with the front **ALL the way down and the glass panels moved to allow access to the hood.** Slide the two panels on your side of the hood one in front of the other so that both panes of glass are between you and your work. You can reach around the panels to handle the materials. This offers you the most protection against spills, splattering, fire and explosion.