

**New York University**  
**Department of Chemistry**

**CHEM-UA.126**

**General Chemistry II Laboratory**

**Spring 2017**

TEXT: **Experiments in General Chemistry, Part II, 2<sup>nd</sup> Edition, Revised Printing** by Barry Rugg & Victoria Russell

INSTRUCTOR: Prof. Barry Rugg

Office: 1001M Silver

Hours: Mon: 10:30-12:30

**Course Schedule**

Week		Exp #	Title
Jan 23	Jan 26	1	<i>CHECK-IN</i> and Safety in the Chemistry Laboratory
Jan 30	Feb 2	2	<b>Intro/Review of the LabQuest<sup>®</sup> Interface (Pre-lab Due)</b>
Feb 6	Feb 9	4	<b>Aspirin History, Chemistry, and Colorimetric Analysis (Pre-lab Due)</b>
Feb 13	Feb 16	5	<b>Properties of Solutions: Colligative Properties (Pre-lab Due)</b>
Feb 20	Feb 23	No lab	<b>President's Day</b>
Feb 27	Mar 2	6	<b>Kinetics; Iodine Clock Reaction—Part A (Pre-lab Due)</b>
		3	<b>Molecular Bonding and Geometry (Take-home Lab)</b>
Mar 6	Mar 9	7	<b>Kinetics; Iodine Clock Reaction—Part B (Pre-lab Due)</b>
Mar 13	Mar 16	No lab	<b>Spring Break</b>
Mar 20	Mar 23	8	<b>Le Châtelier's Principle (Pre-lab Due)</b>
Mar 27	Mar 30	9	<b>Determining an Equilibrium Constant (Pre-lab Due)</b>
Apr 3	Apr 6	10	<b>Titration of Acids and Bases (Pre-lab Due)</b>
Apr 10	Apr 13	11	<b>Buffered Solutions; Designing Solutions to Resist Changes in pH (Pre-lab Due)</b>
Apr 17	Apr 20	12	<b>K<sub>sp</sub>—Studying the Solubility of Insoluble Salts (Pre-lab Due)</b>
April 24	Apr 27	13	<b>Electrochemistry—An Introduction to Oxidation-Reduction Chemistry (Pre-lab Due)</b> <i>CHECK-OUT*</i>
May 10		Final Exam	<b>10:00-11:50 am; rooms to be announced</b>

**Take Home Lab**

Week		Exp #	Title
Feb 27	Mar 2	3	<b>Molecular Bonding and Geometry (take home lab due in the laboratory class)</b>

Laboratories will be held in room **151 Brown**.

\*Students who do not check out will receive a grade of incomplete (I).

## General Information

**Purpose:** Chemistry is an experimental science. This means that, in general, chemical theories have followed observations made in the lab. Even the theoreticians are not happy unless their work agrees with experimental data. This is the importance of experiments to Chemistry.

### Why is laboratory work important to you?

In the lecture course, you will encounter a barrage of chemical facts and be exposed to a torrent of theories. You probably won't be able to just memorize all of it, and you certainly won't understand it unless you make connections between related facts and fit them to their underlying theory. The laboratory course is intended to help you to see the connections. You are not expected to repeat the great discoveries of science in a series of 4 1/4 hour lab sessions. However, by performing the assigned experiments, you will observe the phenomena that led to some of those discoveries. Hopefully, this will help you to understand the underlying chemistry, as it did for the original researchers.

In the Chemistry Laboratory II course, you will be introduced to a number of techniques that will serve you well in the future. If you doubt that, stop and talk with me. I'm sure that we can find some relevance to you. Try to learn the techniques as well as you can. Your experimental results (i.e. GRADE) will depend on it. If you don't know how to do something, ask. The instructors are there to teach you what you don't know!

Many of the experiments will involve the use of computer- interfaced instruments. We have recently renovated our general chemistry laboratories and we have installed new upgraded computer equipment in order to shift the emphasis of the course from procedure to analysis. You will still need to learn good technique. You will still work with chemicals and laboratory apparatus. The computers will simply record data and allow you to examine it in ways that would be difficult or impossible with conventional methods. We hope that the new equipment will allow you to learn chemistry more effectively.

### New Lab Manual and Web Site

The lab manual (cited above) is complemented by a web site (Webcom) specifically designed to provide help and support in preparation for each experiment. When you purchase the lab manual, you will be given an access code to set up a personal account at the Webcom site. Access codes are not reusable. Once you set up the account with user ID and password, this is all the information you will require to log on. You will have to provide your mother's maiden name when you set the password. If you forget the password, it can be retrieved with your mother's maiden name through an automated system. User ID, password and mother's maiden name are all case sensitive and so be careful to record exactly how you set up your log on access.

Once you have access to the Webcom site, check out the different tabs (Welcome, Lab resources, etc.). In the **Lab content** tab you will find a *drag-and-drop reinforcement activity* and a *pre-lab assignment* for each experiment. The reinforcement activity should be attempted after you read the *Background Information* for each experiment in the lab manual. Each experiment has also a **PowerPoint presentation** (excluding the *Safety in the Chemistry Laboratory* (Experiment 1)), which is posted on **NYU Classes** in the resources tab.

The Safety in the Chemistry Laboratory (Experiment 1) is accompanied by a 25-question test (found at the Webcom site) using multiple choice, matching and true/false type questions. There are links to 3 safety videos at the Webcom site (and below) that should be viewed prior to attempting the on-line Safety Quiz. You must get at least 80% correct but you can take the test as many times as you like until you get 100% up until the deadline (2 hours before the your scheduled time for Experiment 2). *This grade is recorded as a full lab grade that will give everyone a nice start to your lab experience.*

Experiment 3 is a take home lab on Molecular Bonding and Geometry and is to be completed at home. This experiment will be done by hand in the Lab Manual and handed in when you come into lab, Feb 27-Mar 2 (the day you have lab).

### NYU Classes

In addition to the Webcom site described above, I make extensive use of the NYU Classes System which is used for communication with this rather large class. I will send **emails** to the class via NYU Classes so please

check your emails daily. Not reading your email is no excuse for the lack of vital information. If you are registered for the course and not receiving email notifications the other students are getting, notify me immediately so that I can remedy the situation. You can find **PowerPoint presentations** for each lab and the **course software** at the NYU Classes site (Sec001).

### Required Safety Videos

Rugg Safety Part 1

<https://www.youtube.com/watch?v=RHC30lmNQuA>

Rugg Safety Part 2

<https://www.youtube.com/watch?v=u9a-60rCNR4>

ACS Safety Video

<https://www.youtube.com/watch?v=0zHev9iM8kU>

### How to Prepare for Each Experiment

The new lab manual and web site are meant to be used together. You will find some repetition from one medium to the other. Repetition is good as you get used to the new system. To prepare for each experiment (Experiments 2-13), **first** read the Background Information in the lab manual (including sample calculations); **second** review the PowerPoint presentation available at NYU Classes site (Sec001) in the Resources tab (Laboratory folder) in pdf format (which you can print if you choose). **Third**, you can try the drag-and-drop reinforcement activity to test yourself on the experiment content.

The **Pre-Lab Assignment**, which will be completed on-line at the Webcom site, is due before you come to lab. The pre-lab assignment includes general safety questions and relevant technique questions; also several questions based on the content in the **Background Information** with a focus on the **sample calculations**. The pre-lab assignments are available to you one week prior to the lab and must be completed by 11:59 PM the evening before lab. The pre-lab assignment is worth 40% of the lab grade. You will have two hours to complete the Pre-Lab assignment once you have started. It cannot be paused once you have begun. You will have one attempt at the assignment. In addition to the online pre-lab assignment, you are required to prepare a **Flowchart** for most experiments (Experiments 4-7, 9-13) or **Data Sheets** (Experiment 8).

**Please take note that in all computations, you must pay particular attention to proper units and number of significant figures.**

ALL ANSWERS FOR TESTS AND QUIZZES TAKEN ON-LINE WILL BE AVAILABLE AT THE WEBCOM SITE GRADEBOOK ON THE DAY AFTER THE ENTIRE CLASS HAS COMPLETED THE EXPERIMENT.

You will be able to access your grades for the written portion of the lab at the Webcom site as they are recorded. It is your responsibility to make sure the grades recorded on Webcom are correct and consistent with the graded lab reports returned to you.

When you enter the lab, you will go to your assigned lab station with your partner and wait for some introductory comments by your instructor. After these comments, you will be instructed to begin the experiment. The experiment has both a **data section** and a **post-lab section**. The data section is where you record the results of the experiment. The post-lab contains question to be answered based on the contents of the experiment. It is advisable to read the post-lab questions to prepare yourself for what you will be required to do after you complete the experiment. This can help to complete the experiment in a timely manner. You and your partner will work collaboratively on the data and post-lab sections and hand in one report for the two of you.

You should listen for announcements and monitor the whiteboard for any changes that are made as the experiment is performed. It is your responsibility to notice and follow these instructions.

During the experiment, feel free to ask (reasonable) questions. It is a learning experience, not a test. It is probably best to ask an instructor your question since your classmates are no more experienced than you. You will work with a partner for all experiments.

Dry labbing (reporting data which you and your partner did not collect yourselves) is cheating and will be treated as such. If you are caught using data from another student, from another semester, or from your imagination, you will fail this course. I think it is only fair to point out that the laboratory is monitored by video equipment 24 hours a day (to protect the computers, of course).

**SAFETY IS OF PARAMOUNT IMPORTANCE IN THE LABORATORY.** If you do not follow the safety rules presented to you, you will be removed from the lab and you will lose credit for the experiment.

**THERE WILL BE NO MAKEUP LABS.** If you are too ill to attend lab, see a doctor or go to NYU Health Services. You are required to bring to me documentation that will verify your illness. The documentation must be on a physician's stationary, and I may call for verification. Excused labs will not count when we evaluate your grade. Similarly, if you must miss a lab because of religious observance, you should provide some documentation to be excused. **THERE WILL BE NO EXCEPTIONS TO THESE RULES.**

**IF YOU DO ANY UNAUTHORIZED EXPERIMENTATION, YOU WILL FAIL THE COURSE!!!**

Required Materials:

- Everyone will be required to purchase **disposable lab coats** for use during the experiments. The chemistry stockroom will provide the lab coats for you (at cost). These coats will be disposed of after each experiment by the lab personnel.
- Appropriate, **full coverage Safety goggles** (available at the NYU Bookstore)
- **Rubber gloves** (disposable are available at the chemistry stockroom; reusable rubber gloves can be purchased in supermarkets).
- The required text is entitled **Experiments in General Chemistry II, 2<sup>nd</sup> Edition, Revised Printing by Barry Rugg and Victoria Russell**, ISBN: 978-1-5249-1317-5 (must be bought at the NYU Bookstore).
- Software called **Logger Pro<sup>©</sup>** is also required and is available for free download from the course NYU Classes site (Sec001, resources tab, course software folder)

**Lab Equipment Breakage:** to cover replacement costs for laboratory supplies and equipment damaged due to accidents or misuse, all students taking a laboratory class are required to have an active **Campus Cash** account. I suggest at least \$25 for breakage. The replacement fees for broken laboratory supplies and equipment can **only** be paid for using your Campus Cash card – We cannot accept cash, checks or credit cards.

**Clothing Lockers:** Personal belongings are not permitted in the lab. Coats, book bags, purses, etc., will have to be placed in a hall locker. These lockers are located on the 4<sup>th</sup> floor of the Silver building. How to use the clothing lockers...

- a. Go to any locker on the 4<sup>th</sup> floor.
- b. Place your items inside and close the door.
- c. On the keypad press **C**, then **any 4 number combination you will remember**, then the **key (lock button)**. The lock will engage. I suggest you take a picture of your locker as a record.
- d. To open the locker, simply repeat the earlier steps – Press **C**, then **the same 4 number combination that you entered earlier, followed by the key (lock button)**. The lock will release. After you have removed your items, please leave the locker as it is, you do not need to re-engage the lock.
- e. Please note that once the lock engages it will only remain locked for 5 hours. You must return as soon as possible following your lab and reclaim your belongings. *After 5 hours have passed, the lock will disengage automatically, and the contents will be accessible to anyone.*
- f. **\*Items left in a locker past their removal time are subject to removal and disposal.\***
- g. If your locker does not open, the stockroom staff will be able to help you open your locker if you can prove it's your locker (take a picture).

**Waste Minimization:** In an effort to minimize costs and to minimize any environmental damage, we all will make a concerted effort to avoid wasting laboratory materials and to dispose of all chemicals and other materials properly. With this in mind, you must observe the following rules in the lab:

- a. When you obtain a reagent for use in an experiment, read the label on the bottle; make sure that the substance name, its chemical formula, and its concentration match those specified in the directions for the experiment.
- b. Take only the amount that you need, and **DO NOT RETURN** any reagent to the bottle
- c. Dispose of all materials into the proper waste container (again, read the labels). **NOTHING WILL GO INTO THE SINKS. DISPOSABLE PIPETS, and (of course) BROKEN GLASS MUST** be disposed of in the "Broken Glass" container (not the regular trash) with rubber gloves and disposable pipets. Liquid chemical waste from the experiments is disposed of in the designated waste drum in the center of the lab.

The most important of the rules that we follow is

## **WEAR SAFETY GOGGLES AT ALL TIMES IN THE LABORATORY**

**Proper Lab Attire is required!!!**

- a. As stated above, everyone will be required to wear disposable lab coats during each experiment.
- b. Clothing that covers your legs and shoulders are required for this course. This does not include tights or stockings or ripped jeans.
- c. No shorts or short skirts
- d. No exposed bellies
- e. Closed shoes must be worn at all times. No ballet flats, flip flops, or open shoes of any kind are permitted.
- f. In other words, minimal skin should be showing from the waist down. If you come to lab improperly dressed, you will be sent home.

Please shut off your cell phones while in the lab.

- g. Receiving calls or texting is not permitted.
- h. IPODs are also not permitted,
- i. Food or water is not allowed in the lab.
- j. Gum chewing is not permitted.

Failure to follow any of the rules will result in expulsion from the laboratory!

**Miscellaneous:** The rules listed above are necessary if you are to have a safe, educational, and productive experience this semester. We hope that you will also enjoy the course. The instructors and I will be glad to assist you and to answer reasonable questions. However, we will be busy so please don't ask things that you can figure out by yourself (e.g. "Is this green?").

Many of the experiments are scheduled to follow the topics of the lecture portion of the course. Try to see the connections between the two. It will help you to understand the material covered. Completed laboratory reports are due on the day that you perform the experiment, before you leave the laboratory. Instructors are not authorized to accept laboratory reports after the class has ended. Late labs lose points or may not be accepted.

**Finally:** The lab reports have three parts, the pre-lab (to be completed on-line before the lab commences), the data and calculations and the post-lab. Since you will be working with a partner, you and your partner will have identical data. As stated above, you and your partner will work together to complete the post-lab sections of the experiment. You never work alone in this laboratory! If your partner is absent, we will assign someone to work with you. Since you will work closely with your partner, you will constantly be discussing the experiment as well as the required calculations.

In order to do a good job on the experiments, it is essential you come well prepared. Reading the experiment for the first time in lab will put you and your partner at a disadvantage and make it very difficult to complete the experiment on time. You are advised to use the new lab manual, use NYU Classes with its PowerPoint presentations, use the Webcom site with its learning objects, and complete the pre-lab assignment as

required before coming to lab. You may further prepare by reading and completing any post-lab questions you are able to do before arriving at the lab.

If you have any technical questions on the pre-lab, data section or post-lab assignments, you are encouraged to ask the professor or any of the instructors, many of whom will make themselves available to you if asked before your lab section meets.

**Laboratory Grading Scheme:**

pre-lab and lab reports	75%
written final exam	25%

Each experiment is graded out of 100 points. Each Pre-Lab Assignment counts for 40 points, and the written lab portion for 60 points. This lab grade will be a part of your overall course grade. This lab grade will be incorporated in your final grade for the lecture and laboratory course and will be worth 25% of your final grade.