1. Course Philosophy

This course is designed on the premises that chemistry is:

- an experimental science
- basic to many other areas of scientific investigation and endeavor
- an important part of the background of an educated public

Unlike some laboratory courses in chemistry, the objective of this course is not to demonstrate and confirm principles that are the subject of the accompanying lecture course(s), but rather to apply chemical principles in a series of exercises based largely on “real world” materials—many of which are found around the home. Indeed, in some instances, you will be asked to bring such samples to the laboratory for the purpose of studying one or more of their properties. In many of the exercises, results will be known neither to you, nor to the course staff, prior to completion.

The course prerequisites assume that you have already been exposed to most of the
necessary principles. When new principles are called into play, they are described briefly in the introductory sections of the laboratory modules. They will also be described in the “discussion sections” that precede each laboratory meeting. The discussion sections are also used to alert you to special considerations of safety, to help you plan your laboratory activities efficiently, and to provide occasional historical and practical background information. The number of students involved in each of the course sections makes it difficult to engage in much interchange in the pre-laboratory discussions. In order to provide you with a more individualized environment in which to raise questions dealing with a given exercise, Teaching Assistants conduct help sessions during most of the week. These permit you to raise questions dealing with forthcoming or previous exercises. The course faculty also maintain office hours.

The written exercises are not lengthy. Most of them should be able to be read and understood in an hour or less. The exercises include “Pre-laboratory” questions—questions that attempt to probe whether you understand the purpose of the exercise and how it is to be conducted. These pre-laboratory questions are collected at the beginning of the relevant laboratory section. They will be graded and the results will be part of the grade assigned to the exercise itself. We assume that you have read the exercise and resolved any individual problems of understanding before you attend the pre-lab lectures and, of course, the laboratory meeting. To ensure that you do so, three (3) quizzes are administered during the semester at times prescribed in the syllabus. You are responsible for knowing the name of the pre-lab discussion instructor, the faculty member in charge of your laboratory section, the laboratory coordinator and your teaching assistant.

The observations and conclusions reached in the exercises are normally turned in at the end of each laboratory period—usually on data sheets that are part of the exercise itself. Except in rare circumstances, there are no laboratory reports for you to complete at home. When you leave the laboratory, your only obligation is to prepare for the forthcoming exercise. For that reason, we place a high priority on the diligence with which you engage in preparation for the exercises.

The exercises are of two types:

- **Preliminary exercises**: in which you will apply principles and techniques to samples of materials in an effort to understand and perfect techniques
- **Test exercises**: in which you will apply similar principles and techniques to **unknowns**—samples whose properties and/or identity are known to the course staff but not to you

## 2. Pre- and Co-Requisites

High School Chemistry is pre-requisite to CHE 133. CHE 131 or CHE 129 are co-requisites.
3. Text


4. Other Course Requirements

The following materials are required for the laboratory:

- State-acceptable goggles
- Padlock
- Hard-covered, bound, notebook with pre-numbered pages
- Cloth towel (paper towels will not normally be provided)
- Response pad—details will be provided in first lecture
- (Graph paper, which is provided as part of this manual)

Students are strongly advised to bring calculators to the laboratory and whenever quizzes are scheduled. No other electronic devices are permitted to be used when quizzes are administered.

5. Americans with Disability Act

If you have a physical, psychiatric/emotional, medical or learning disability that may impact on your ability to carry out assigned course work, you should contact the staff in the Disabled Student Services office (DSS), 632-6748. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information about, and documentation of, disability is confidential.

6. Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Adopted by the Undergraduate Council September 12, 2006

Stony Brook takes academic honesty very seriously. Students are expected to present work as their own only when it is, in fact, their own. Stony Brook has not adopted a universal honor system, in which the responsibility for academic honesty resides totally in the student body. As a result, departments implement a variety of measures to prevent acts of dishonesty. These measures are not foolproof, but they are intended to give every possible benefit to the honest, hard-working student.
Laboratory courses are environments in which some acts of dishonesty might be
difficult to detect. The CHE 133 instructional staff will take a series of measures to
minimize such possibilities. If, in spite of these, occurrences of academic dishonesty
occur, we will follow the campus procedures for reporting such instances. By aca-
demic dishonesty, we understand

- Acts of plagiarism (presenting someone else's work as your own)
- Interference with the activities of another student
- Fabrication of data

7. Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and prop-
erty of other people. Faculty are required to report to the Office of Judicial Affairs any
disruptive behavior that interrupts their ability to teach, compromises the safety of
the learning environment, and/or inhibits students' ability to learn.

8. CHE 133 Grading

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Weight</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Quizzes</td>
<td>@ 50</td>
<td>100</td>
</tr>
<tr>
<td>1 Comprehensive Quiz</td>
<td>@ 100</td>
<td>100</td>
</tr>
<tr>
<td>5 Online Pre-Lab Assignments</td>
<td>@ 10</td>
<td>50</td>
</tr>
<tr>
<td>4 Preliminary Exercises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Test Exercises</td>
<td>@ 100</td>
<td>200</td>
</tr>
<tr>
<td>3 Online Virtual Labs</td>
<td>@ 50</td>
<td>150</td>
</tr>
</tbody>
</table>

| Total                       |        | 800   |

Any deviation from the above scheme will be announced at the first class meeting.

Quizzes

Quizzes are short (typically 15 min.) closed-book tests. They are administered in the
laboratory and deal with information about past exercises and the exercise scheduled
for the day of the quiz. They seek to measure your understanding of what you have
done or will do in the laboratory. The quizzes are closed book. There is generally
no opportunity to make up a missed quiz after-the-fact. The last (comprehensive)
quiz includes questions about both recent exercises and some dealing with the entire
course material. The comprehensive quiz is given in the laboratory on checkout day.
Online Pre-lab Assignments
These are data customized pre-lab assignments that will be available on either Blackboard or the course website a week before the scheduled lab. These assignments are in spreadsheet format. You will download the spreadsheet, then type your name and ID # into the proper cell. Print the spreadsheet, answer the questions on the spreadsheet, and submit the sheet to your TA before beginning the exercise. In some pre-lab assignments, we might ask you to answer the questions online for grading purposes. You will be informed of this when necessary.

Preliminary Exercises
These exercises normally expose you to a new technique for the study of a class of materials. They will often involve materials whose identity and properties are known. Preliminary exercises are graded on the basis of:

- the quality (e.g., precision, completeness of observations) and format (e.g., proper use of significant figures) of your reported results
- your answers to the pre-laboratory questions
- adherence to safety regulations
- proper use of an acceptable laboratory notebook

Test Exercises
These exercises generally involve individualized “unknowns”—materials whose identities or properties are known to the course faculty but not to the student or to the teaching assistant. The extent of your preparation for test exercises will generally be checked by a brief “pop” quiz administered at the beginning of the laboratory session. Grades on test exercises will be based on:

- the accuracy and precision with which your reported results agree with the known values of the requested properties
- your answers to the pre-laboratory questions
- adherence to safety regulations
- proper use of an acceptable laboratory notebook

Online Virtual Labs
These are online simulated exercises to link chemical computations with authentic laboratory exercises. These will provide you the opportunity to practice the skills and techniques of the lab exercises by selecting proper chemical reagents and equipment, and manipulating them in a manner resembling a real lab. Instruction on these will be provided over the semester either on the course website or Blackboard.
Notebooks
Laboratory notebooks will be checked each laboratory meeting. The notebook grade will be integrated in the grade for each exercise. They will be graded on their compliance with specifications and the completeness with which they record what has been done in each exercise. See Laboratory Notebooks (Section 9).

Identical Results
Students reporting identical results in any parts of experiments not explicitly indicated in advance as group efforts will earn a 0 for all students reporting the identical results. See Academic Integrity (Section 6). If you have doubts about whether you may use someone else's results, check BEFORE doing so.

Regrade Requests
Preliminary exercises are graded by your own TA. Issues dealing with grading should be discussed with your TA. After each final laboratory exercise, a grading standard is posted. Students who believe that their exercise has not been graded consistent with the standard may submit a re-grade request form (obtainable on the bulletin board or the course web site) along with their original report, for reconsideration. Only cases of inconsistency with the standard will be considered. Students may also request re-grades of quizzes. Requests for re-grading must normally be submitted within one week after the item has been returned to the student. No requests for re-grading will be accepted after a lapse of more than two weeks from that time. Only original documents completed IN INK will be considered for re-grading.

Absences and Make-Up
An absence from a laboratory session or from a quiz results in a grade of zero (0) for that activity. After-the-fact make-up sessions are not generally possible. If an absence can be anticipated, the student should contact the Laboratory Coordinator. An attempt will be made to schedule the student in an alternate laboratory session performing the same exercise, provided there is space in that session. Such requests must be made in writing. Students are responsible for procedural information and discussion section information relating to missed exercises. Absences from four or more exercises for any reason will result in a failing grade.

Absences due to medical or other emergencies will be viewed as Excused only if they are supported by official written documentation provided to the Laboratory Coordinator.

9. Laboratory Notebooks
The maintenance of a laboratory notebook is an important part of the Introductory Chemistry Laboratory experience. These written records of what transpires in the laboratory are critical to the practice of chemistry and other laboratory sciences. In the real world, they constitute the basis for published results of investigations (which usually summarize laboratory procedures), verification and reproduction of important procedures, and determination of claims of discoveries and ownership of
inventions. In the instructional laboratory, they are the source document for all the results you report on the data sheets for each exercise.

The objective of a laboratory notebook write-up can be summarized as to permit another scientist to be able to tell what was done in the laboratory in sufficient detail as to be able to reproduce the procedure and get the same or a consistent result.

WHAT SHOULD GO INTO A LABORATORY NOTEBOOK?

- The pages must be numbered sequentially and they must never be removed.
- Entries must be in ink. There should be no erasures—errors should be clearly lined out and replaced with corrections. White-out must not be used.
- The notebook should be a complete record of what was done. (Completeness is much more important than neatness). The data sheets on which grading is based, however, must be neat and devoid of corrections.
- Entries must be dated.
- Unusual environmental conditions should be noted (e.g., an impending hurricane, extremes in ambient temperature, power failures/surges).

WHAT SHOULD NOT GO INTO A LABORATORY NOTEBOOK?

- Lecture notes, personal matters, material from other courses

In a populated laboratory such as that associated with an introductory course, a few other considerations could turn out to be important. For example, several analytical balances may be available. It is important to note which one is used in a weighing. It is important to note if different balances are used to determine initial and final weights of objects. If more than one container of a reagent is available, it is important to note if samples of the same material are taken from different containers.

A student laboratory notebook should have enough detail to permit the determination of what step or steps in a procedure may have introduced discrepancies (e.g., when unknowns are involved, or when different results are reported on the same known material). The laboratory notebook is critical in the extremely rare instance when a report is misplaced or lost.

Devices

Ideally, when performing quantitative experiments, the devices used (e.g., balances, burets, pipets, volumetric flasks, etc.) should be calibrated. In an introductory chemistry laboratory, time may not always permit calibrating such devices.

Some types of errors will be minimized by consistently using the same device for the same type of measurement. Whenever possible, a unique identifier of a device should be recorded. If the device does not appear to function as expected, a comment to that effect should be noted and reported. If there is a significant malfunction, the attention of an instructor is mandated.
Reagents
Again, ideally, the student investigator should prepare all the necessary reagents for an exercise. Preparing a reagent means noting the purity and assay of the starting materials and using the appropriate quantitative techniques for the preparation of solutions. In the introductory laboratory, stock solutions are often provided to save time. An individual student has little control over the quality of the reagents provided. Assuming that no one has changed the stock chemical in any way, it should contain what its label indicates. At the very least, the laboratory notebook should indicate the data on the label of the stock solution (with the appropriate number of significant figures), e.g.,

<table>
<thead>
<tr>
<th>Sodium Hydroxide Solution</th>
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<tbody>
<tr>
<td>NaOH</td>
</tr>
<tr>
<td>0.1037 M</td>
</tr>
</tbody>
</table>

Other Materials
In instances where the student provides some of the materials for an exercise, the identity of the material must be recorded in detail, along with all relevant data.

Except in unusual circumstances, the material should be brought in its original container.

10. Laboratory Safety
Stony Brook University takes laboratory safety very seriously. Its safety practices derive from Federal and State laws and regulations. Students are required to be aware of basic safety procedures. These are embodied in an agreement that each student is required to read and sign. The agreement is at the end of this chapter.

The first laboratory session will include basic instruction in safe laboratory practices, procedures and the location of important safety devices.

Safety Goggles
New York State law requires that students wear approved safety goggles at all times while in the laboratory. Specifications of approved goggles are also a matter of law.

- Students will not be permitted to work in the laboratory if they are not wearing safety goggles
- Points will be deducted from the grade for a particular exercise if a student is observed not wearing safety goggles at any time during the laboratory period
- Students who persist in not wearing goggles will be expelled from the course
Proper Clothing
You must wear sensible clothing while you are in the laboratory. Avoid wearing the following items to lab: tank tops or cropped shirts, mesh shirts, shorts or skirts that do not cover your knees when you are sitting, sandals, flip-flops, or other shoes that do not completely cover your feet. Sandals with socks are not considered appropriate attire. You will not be permitted to engage in laboratory work if you are not properly attired.

Proper Handling Of Reagents
You will generally be told, or asked to calculate, how much of a particular reagent you need to take to your laboratory station for a given exercise. You should take only that amount. Dispensed reagents should never be returned from your container to the stock container. There will be occasions on which exercises require the use of reagents that can be corrosive to the skin or to clothing. The written exercises highlight these reagents and their proper use is described. We will always provide means for the transfer of such reagents in a safe manner.

Toxic Materials
The exercises are designed to minimize the use of toxic substances. Nevertheless, many involve the use of common household substances, which can be toxic if handled inappropriately. Every effort will be made to alert you to the proper handling of any toxic or corrosive materials.

Laboratory Glassware
Proper handling of glassware is an important part of laboratory practice. In those rare events when a glass object breaks, the fragments are not to be picked up using the hands. Dust pans and brushes for that purpose are provided in each laboratory room. Students are expected to clean up broken apparatus and spills.

Volatile Substances
Some reagents that are used in the exercises are volatile. If their vapors are either flammable or toxic, procedures involving such reagents must be carried out in the fume hoods provided in the laboratories.

Flames and Hot Objects
Bunsen burners will be used on some occasions to heat materials. The apparatus used to heat materials in a Bunsen flame must be secure. Instructions will be given on how to accomplish this most effectively. On other occasions, heating will be accomplished through the use of hot plates. Students must exercise appropriate care in handling objects that have been heated. Flames should never be permitted in areas where flammable substances are used.

In those rare instances when the improper use of a flame causes fire to occur, nearby students should be advised and the teaching assistant should be informed immediately. Teaching assistants have all received special training in the management of laboratory fires.
11. Laboratory Items Not in Student Kits

Some exercises require apparatus that is not included in your personal kit. Such apparatus is available in defined places in the laboratory rooms, e.g., balances, burets, buret stands, ring stands and other hardware items. These must be returned to their defined places when you finish the exercise. Some exercises require special apparatus that will be distributed to you by the teaching assistants. This apparatus must be returned to the teaching assistants when you finish with their use.

The following True/False questions probe your understanding of the contents of this document. You are responsible for knowing the correct answers. If you have doubts about any answer, re-read the document.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1.</td>
<td>CHE 133 will occasionally require knowledge obtained in an earlier high school chemistry course.</td>
</tr>
<tr>
<td>2.</td>
<td>The requirement to wear safety goggles is a local Stony Brook rule.</td>
</tr>
<tr>
<td>3.</td>
<td>Students who wear prescription glasses need not wear safety goggles.</td>
</tr>
<tr>
<td>4.</td>
<td>The edition of the required laboratory manual is the 6th.</td>
</tr>
<tr>
<td>5.</td>
<td>Paper towels will normally be provided for drying glassware.</td>
</tr>
<tr>
<td>6.</td>
<td>Students must bring in graph paper when required in an exercise.</td>
</tr>
<tr>
<td>7.</td>
<td>The lowest grade on a preliminary exercise will be dropped.</td>
</tr>
<tr>
<td>8.</td>
<td>Points are assigned for bringing in requested materials.</td>
</tr>
<tr>
<td>9.</td>
<td>The lowest quiz grade, even if it is a zero assigned for an absence, will be dropped.</td>
</tr>
<tr>
<td>10.</td>
<td>Students may not consult the printed exercise during a quiz.</td>
</tr>
<tr>
<td>11.</td>
<td>Students may submit data sheets completed in pencil for re-grading.</td>
</tr>
<tr>
<td>12.</td>
<td>If you miss an exercise, you are responsible for quiz questions relating to that exercise.</td>
</tr>
<tr>
<td>13.</td>
<td>The custodial staff will clean up any broken apparatus or spilled chemicals in the laboratory.</td>
</tr>
<tr>
<td>14.</td>
<td>Students are expected to bring “White-Out” to the laboratory to make corrections in their laboratory notebooks.</td>
</tr>
<tr>
<td>15.</td>
<td>Under no circumstances can two students report identical results in an exercise.</td>
</tr>
<tr>
<td>16.</td>
<td>It is necessary to wear goggles even when only doing calculations.</td>
</tr>
</tbody>
</table>
Stony Brook University Department of Chemistry
General Chemistry Laboratory Safety Agreement

Please read this safety agreement carefully, sign the agreement, date it, and give it to your teaching assistant. No one will be permitted to work in the laboratory until this form has been signed and submitted.

1. I will not attempt unauthorized experiments.

2. I will wear acceptable eye protection at all times in the laboratory. I understand that the wearing of contact lenses in the laboratory is generally prohibited for safety reasons.

3. I will not leave my jacket and other belongings on the laboratory bench.

4. I will dispose of laboratory wastes in the proper manner.

5. I will wear sensible clothes in the laboratory.

6. While in the laboratory, I will never put anything in my mouth.

7. I will notify my instructor of any of the following:
   • any injury whatever, to myself or to another student
   • spilled mercury or a broken thermometer
   • any other condition that I believe may be hazardous

8. I understand that I may be asked to leave the laboratory if I do not follow accepted safety practices.

I have read the above carefully and agree to these conditions, acknowledging that safety in the chemistry laboratory is, in part, my responsibility.
SUSB-001a
Stony Brook University Department of Chemistry  
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Signature  
Date