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The History of the Department of Chemistry

Chemistry at Brown University traces its origins to the appointment of the first professor of chemistry in 1811. The field developed slowly during the first half of the nineteenth century with one or two chemists on the faculty. The chemistry department was at that time, located in Rhode Island Hall. The pace quickened in 1862 with the construction of Rogers Hall to house the work of the Department. John Howard Appleton (1844-1930), joined the faculty during this era, and remained the dominant force in the development of chemistry at Brown until his retirement in 1914. John Howard Appleton or 'Johnny App' as he was affectionately known, was associated with this university and department in a variety of capacities for many years He held appointments as Instructor 1863-68, Professor of Chemistry Applied to the Arts 1868-72, and as the inaugural Newport Rogers Professor from 1872 until his retirement in 1914. An excellent scholar and teacher, he authored 12 books on various aspects of chemistry. The friends and family of Professor Appleton endowed the Appleton lectureship to the Brown University Chemistry Department in 1922.

The modern history of the department began in 1923 with the construction of the Metcalf Chemical Laboratory. The Metcalf family patronage of chemistry at Brown continued 15 years later with the construction of the Metcalf Research Laboratory. The two buildings were linked in 1963. In 1982 the Chemistry Department moved into its present research quarters, a newly constructed, $18 million research facility shared with the Department of Geology. Metcalf Chemical Laboratory continued to house the instructional laboratories and classrooms of the department until the construction of MacMillan Hall in 1998.

Important figures in the development of the department during the period following 1923 included: Samuel T. Arnold, who joined the department in 1913 and served as Dean of the College (1930-1946), Dean of the University (1946-1949), and Provost (1949-1956); Robert F. Chambers, who joined the department in 1916 and served as Chair for many years until his death in 1946; Charles A. Kraus, who joined the department in 1924, and remained active for many years after his retirement in 1946; and William Walker Russell, who was a member of the faculty from 1926 until his retirement in 1965. During and following this period, many well-known chemists have served on the faculty, including Lars Onsager (1928-1933), W. A. Noyes (1929-1938), R. M. Fuoss (1932-1936), P. C. Cross (1938-1949), Leallyn B. Clapp (1941-1983), Donald F. Hornig (1946-1956, 1970-1977), Robert H. Cole (1947-1990), John Ross (1953-1965), J. F. Bunnett (1958-1965), William T. King (1960-1981), Richard Eisenberg (1966-1973), Eugene Stevens (1966-1977), Julian H. Gibbs (1960-1979), and Edward A. Mason (1967-94).

Graduate work in chemistry was instituted in 1887, with the first master's degree awarded in 1891 and the first doctorate in 1903. As of June 2011, 799 PhD, 171 MSc and 86 MA degrees have been earned in Chemistry.
Department of Chemistry Faculty Roster 2012 – 2013

Amit Basu
Carthene Bazemore-Walker
Wesley Bernskoetter
David Cane
Sarah Delaney
Gerald Diebold
Jimmie Doll
Kathleen Hess
Eunsuk Kim
Christoph Rose-Petruck
Sandra Russo-Rodriguez

Jason Sello
Christopher Seto
Richard Stratt
J. William Suggs
Shouheng Sun
Dwight Sweigart
Lai Sheng Wang
Li-Qiong Wang
Peter Weber
Paul Williard
Matthew Zimmt

Admissions Procedures

The Graduate Admissions Committee reviews more than 300 applications for the graduate chemistry program each year. Each application is considered individually by the members of the departmental admissions committee, and then discussed in a series of committee meetings. Occasionally the committee will seek consultation from other members of the department faculty. The Department Chair and the Dean of the Graduate School then review applications recommended for acceptance. Offers of admission are usually coupled with some form of financial support, generally in the form of a teaching assistantship or fellowship. Applications can be initiated at www.brown.edu/gradschool/apply.
The Chemistry Graduate Program and Curriculum

The Department of Chemistry offers a program of graduate work leading to the PhD in Chemistry as well as to the ScM and AM degrees. This handbook describes the sequence of graduate study requirements (milestones) and the professional responsibilities of students in the Chemistry PhD program.

Chemistry PhD Program - Milestone Timetable (details below)

<table>
<thead>
<tr>
<th>Year 1 - Fall</th>
<th>Year 1 - Spring</th>
<th>Year 1 - Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>classes, teaching, seminars, ESL, identify possible research advisors</td>
<td>classes, research, teaching, ESL seminars</td>
<td>research, seminars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2 - Fall</th>
<th>Year 2 - Spring</th>
<th>Year 2 - Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>research, teaching, seminars, Cumulative exams</td>
<td>research, teaching, seminars, Research Project Defense - (inorganic and organic students)</td>
<td>research, seminars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3 - Fall</th>
<th>Year 3 - Spring</th>
<th>Year 3 - Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>research, teaching (possibly), seminars, Original Research Proposal Admission to Candidacy</td>
<td>research, teaching (possibly), seminars</td>
<td>research, seminars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years 4, 5 - Fall</th>
<th>Years 4, 5 - Spring</th>
<th>Years 4, 5 - Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>research, teaching (possibly), seminars</td>
<td>research, teaching (possibly), seminars</td>
<td>research, seminars</td>
</tr>
</tbody>
</table>

The preparation and defense of the doctoral thesis is usually completed by the end of five years.

Graduate Courses and Registration Procedures

During the first semester of graduate studies, students enroll in three, one-credit graduate chemistry courses, attend seminars, serve as a teaching assistant and explore potential research advisors / groups. International students also complete English as a Second Language (ESL) classes. In appropriate cases and with approval of the Directors of Graduate Studies (DGS), students may substitute graduate level math, physics, engineering or biology courses for graduate chemistry courses. Students entering with externally funded fellowships take a fourth course in place of the teaching responsibility. The chemistry PhD program does not require completion or a core set of courses. Instead, each student consults with the DGS or faculty advisor (after semester 1) to select courses that, based on individual scientific background and interests, best further her/his professional development. Typically, each student completes 5 to 7 non-research courses during her/his graduate studies. In very rare circumstances, students may begin thesis research in their first semester and receive credit for CHEM2980. The explicit permission of the Chair is required for enrollment in CHEM2980 in the first semester of graduate study. See the section on Graduate Student Evaluation for an explanation of grade expectations for graduate students in first semester and first year courses.
Course Registration Procedures

**First-year Students - first semester courses.** On arrival at Brown, first year students take diagnostic examinations in the sub-fields of organic, inorganic, and physical chemistry, and a fourth exam either in biochemistry or in mathematics / physics. Once graded, the Directors of Graduate Studies (DGS) advise each student in the selection of appropriate first semester courses. Students officially register for classes as soon as registration is possible (day prior to the start of classes) using the on-line registration system, Banner: selfservice.brown.edu.

**First-year Students - second semester courses.** Pre-registration for second semester courses occurs in late October, prior to graduate student assignment to research groups. First year students should discuss selection of likely second semester courses with the DGS and then pre-register for three graduate courses. Graduate students MAY NOT REGISTER for CHEM 1140, 1150, 1160 and 1450 because these are considered undergraduate courses.

Graduate students in good standing after the first semester (see Graduate Student Evaluation,) enroll in two, one-credit classes and for one credit of research (CHEM2980) in their research advisor’s section. Once assigned to a research group, each student should discuss course selection with their research advisor and make any approved registration modifications during the registration period (first two weeks) of the second semester. To register for courses outside the department, students must get explicit permission from their research advisor (after semester 1) or from the DGS (Professors Seto and Kim, semester 1). Typically, students register for at most one course outside the Chemistry Department in a semester. Graduate students who are NOT assigned to research groups and are NOT in good standing after the first semester should consult with the DGS, prior to the start of semester 2, to identify appropriate courses. Any changes must be made during registration period (first two weeks of the semester).

*Examples of appropriate second semester chemistry courses.*

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Physical</th>
<th>Inorganic/Nano</th>
<th>Organic/Bioorganic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1220</td>
<td>Computational Tools in Biochem/Chem. Bio</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>1240</td>
<td>Biochemistry</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1560G</td>
<td>Nuclear Magnetic Resonance</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1560K</td>
<td>Computational Chemistry</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1560K lab</td>
<td>Computational Chemistry Lab</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1620</td>
<td>Chemical Physics</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>Statistical Mechanics</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2210</td>
<td>Xray Crystallography</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2320</td>
<td>Physical Inorganic Chemistry</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2430</td>
<td>Synthetic Organic Chemistry</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2780</td>
<td>Quantum Mechanics</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2nd - 5th Year Students. Continuing graduate students should consult with their research advisor during pre-registration to select courses for the following semester. All registration should be completed using Banner during the pre-registration period. All 2nd – 4th year students should register for a total of three credits per semester. Students registering only for research should choose a triple credit in their advisor’s section of CHEM2980. 5th year students should discuss appropriate course selection with the Graduate Program Administrative Assistant, Rose Barreira, during pre-registration.

Course Changes. Course changes may be made during registration period (the first two weeks of a semester) by securing approval of the instructors involved and the DGS (1st year students) or the research advisor (students assigned to research groups). Graduate students should never drop or add a course without first consulting with the DGS (or the research advisor). Drop – add changes are completed using Banner.

Questions concerning the appropriateness of a course registration should be brought to the attention of either the Graduate Program Administrative Assistant, Rose Barreira or the DGS.

Seminar Program

The seminar program is intended to supplement and enrich the material available through formal course offerings. In addition to the Friday Colloquium, regularly scheduled seminars in physical, organic and inorganic chemistry give all graduate students opportunities to present their own research work and discuss other topics of interest. Occasionally, a series of seminars may be organized around a common theme or special topic of current interest in chemistry. Suggestions for topics are welcome and should be brought to the attention of the seminar organizers. Regular attendance and participation in seminars is an integral part of the graduate program; benefits accrue not only in research, but also in accumulation of the background knowledge necessary for post-graduate study, research proposals and cumulative examinations. Seminar notices are emailed weekly to the entire department and posted on the department website and on bulletin boards. Each student is expected to be a regular participant in at least one of the weekly seminar programs, but all notices should be checked for the possible appearance of topics of special interest. Attendance is noted. Most seminars take place in GeoChem351 or MacMillan115. Please check the weekly announcements.

Organic Chemistry Seminars: Tuesdays at noon in GC351 Host: Professor Sello

Organic Chemistry graduate students are required to give at least two seminars. The first is a literature seminar on a topic of recent interest and is presented during the second semester of the first year of graduate study. Students must receive their faculty advisors approval for this seminar topic. The subject of the second seminar, usually presented in the first semester of the fourth year, is the candidate's thesis research. Outside speakers frequently present their research at the weekly Organic seminars.

Inorganic Chemistry Seminars: Thursdays at noon in GC351 Host: Professor Bernskoetter

Inorganic Chemistry graduate students are expected to present one seminar per year on their own research or on another topic of current interest in inorganic chemistry. Research associates, faculty and invited guests often present inorganic seminars.
Physical Chemistry Tea Sessions  - Thursdays at 3:00PM in GC351 Host: Professor Diebold
Physical chemistry graduate students are expected to present one seminar per year. Physical chemistry graduate students should attend the Tea Sessions regularly, and should make a genuine effort to participate in the seminars by asking questions of the speakers and offering constructive comments on the material covered. Physical chemistry graduate students arrange refreshments served at the Tea Sessions.

Departmental Colloquium  Fridays at 4:00PM in MM115  Host: Professor LS Wang
Attendance at colloquia will give graduate students exposure to the breadth of the field of chemistry. The colloquia introduce students to new techniques and discoveries, allow them to hear and meet current workers in the field, and provide ideas that may be immediately useful in one’s own research. For all these reasons, attendance at the Friday colloquia is expected and attendance is monitored.

Every effort is made to send invitations to colloquium and other seminar speakers in the summer prior to the academic year. Members of the graduate student seminar committee (GSSC) invite at least three colloquium speakers each academic year. Graduate student suggestions for colloquium speakers should be discussed with members of the GSSC. Graduate students are welcome to suggest speakers for the other seminars; please contact your faculty advisor or the faculty member hosting the particular seminar series. Speakers typically spend the entire day on campus meeting with faculty. Graduate students are encouraged to present their research to the colloquium speaker. Please contact Megan Bucka at least one week prior to the colloquium. To meet with other external speakers, graduate students should contact the host faculty member and Megan Bucka at least one week prior to the date of the seminar.

The Appleton Lecture
This endowed lecture, named in honor of Professor John Howard Appleton, is among the most significant events held annually in the Department of Chemistry. Typically, the Appleton Lecturer presents one seminar appropriate to the general public and a second seminar appropriate for a scientific audience. This two-day event includes a dinner to which senior graduate students and undergraduates are invited.

The Leallyn B. Clapp Endowed Lectureship
This endowed lecture was established in 1990 in memory of Professor Leallyn B. Clapp. The program consists of an annual lecture or workshop on issues of current scientific or educational interest.

Extra-Departmental Seminars
On campus seminars are held by Engineering, IMNI, Math, Physics, and Life Sciences that might be of interest to Chemistry students. In addition, many seminars on topics of special interest are held within a short radius of Providence, including at institutions in and around the Boston area, at the University of Rhode Island, Pfizer, Yale and Wesleyan Universities in Connecticut. Seminar notices are posted on the main bulletin board on the 2nd floor.

R. I. Section of the A. C. S. The local section of the American Chemical Society meets monthly. The meetings consist of a social hour, dinner and a technical talk, which, usually, is of broad
Meeting notices are mailed to members of the ACS and are posted in Chemistry. All graduate students are welcome to attend the social hour, dinner and talk.

**Teaching**

Teaching is an integral part of the graduate student education. All chemistry graduate students are required to train as teaching assistants for at least two semesters. This requirement may be fulfilled during the first year or in later years in the case of students who are on fellowship in the first year. Teaching assistants direct laboratory sections, evaluate laboratory reports based on rubrics (criteria) provided by faculty, proctor undergraduate exams and grade undergraduate exams based on rubrics (answer keys) provided by faculty. Teaching assistant responsibilities are limited to a maximum of 20 hours / week, but are usually considerably less time consuming. In the week prior to the start of each semester, teaching assistants meet with the faculty to learn about their teaching assignments and responsibilities. These meetings often include training to familiarize teaching assistants with the laboratories and experiments. The department encourages graduate students to hone their teaching abilities through discussions with faculty and other students, as well as through participation in activities at the Sheridan Center for Teaching and Learning (http://www.brown.edu/Administration/Sheridan_Center/). Teaching assistant professionalism and performance is tracked during the semester and formally evaluated / summarized at the end-of-semester Graduate Student Review. Refer to Appendix I for Job Requirements and Duties of Teaching Assistants and Student Mentors in Undergraduate Courses and the TA evaluation form.

**English as a Second Language (ESL)**

All students required to take English language courses must attend and actively participate in these courses to maintain, “good standing” in the department. Students’ English language skills are tested three times during the first academic year; at the beginning of semester 1 to establish their English speaking and comprehension skills; again at the end of semester 1 to determine improvement, and a third time at the end of semester 2. **The department requires a minimum test score of “3” for continued financial support.** We encourage all international students to speak only English while in the chemistry building. This is difficult at first but greatly helps improve English language skills.

**Choosing a Research Advisor**

All first year graduate students must schedule meetings to discuss research projects with a minimum of five faculty members in Chemistry. Students should start to schedule research meetings with faculty after the first month of classes. It is strongly recommended that first year students meet with all faculty members in their chosen sub-field plus faculty in related sub-fields. Discussing research projects and graduate training opportunities with a faculty member is the most effective means of conveying strong interest in joining that faculty member’s group.

Each first year student is given a form to secure the signatures of the faculty with whom s/he has spoken. The student is then asked to indicate, in order of preference, at least two faculty members with whom s/he would be interested in working. This signed form must be submitted to the Chair no later than December 1. The Chair, in conjunction with the selected faculty research advisors, determines student assignment to research advisors / groups. The pairing of students
and faculty takes into account not only the wishes of the student and faculty, but also the availability of future financial support. The Chair informs each student of the group to which she / he has been assigned.

A change in the initial choice of research advisor may be made later in the first year or even early in the second year. No stigma is attached to such a switch, but the Chair must approve all changes. Questions and concerns should be discussed with the Chair or the Directors of Graduate Studies (DGS).

**Graduate Student Evaluation**

**Graduate Student Review (twice per year)**

The progress of each graduate student is evaluated by the Chemistry Department faculty in December and May of each academic year. At these reviews, the faculty discuss each student's performance in course work, research, teaching, cumulative examinations, RPD, ORP and English language skills (ESL training). Students are expected to make good progress in all areas appropriate to their “year” as they work toward the PhD. Students not making good progress in one or more of these areas will be assigned a status other than “good standing” (see below). Following each Graduate Student Review, the faculty’s assessment of each student’s performance will be conveyed in writing to the student and to the Graduate School.

Students making good progress in all areas appropriate to their “years” in the program are in “Good standing.” A student who has not successfully completed the relevant milestones (course work, cumes, RPD, ORP, English Language Skills) or responsibilities (teaching) or has not advanced their research suitably will be assigned a status of “satisfactory” or “warning” depending on the severity of the deficiencies. The reasons for the status assignment are conveyed to the student in writing along with guidance for how to return to “good standing”. A student on “warning” from the preceding review who has made clear progress may have her/his status changed to “good”, “satisfactory” or may remain on “warning”. If, in the view of the faculty, a student on “warning” has not shown adequate improvement in all aspects of their professional development, the student’s status will be changed to “termination” and the student will be asked to leave the graduate program.

If a first year student's performance is evaluated as below satisfactory at two sequential Graduate Student Reviews, the student will be required to terminate graduate study immediately or to switch to a terminal Master of Arts degree program (unfunded). Following the first two semesters of graduate school, continued work toward the PhD is conditional upon meeting or exceeding performance standards in research, teaching and completion of the program milestones (detailed requirements are given in the “Performance Expectation” sections below).

If, at any time after the first two years, a student's research performance is unsatisfactory, the student will receive an explanatory letter and the student’s status will be changed to “warning”. If the student’s performance does not improve in the following semester, financial support will be terminated. This, in turn will result in termination of graduate study.

For more information about Academic Standing, see Graduate School Handbook (pg. 13, 2011) [http://www.brown.edu/gradschool/academics-research/rules-regulations/forms/grad-school-handbook](http://www.brown.edu/gradschool/academics-research/rules-regulations/forms/grad-school-handbook)
Performance Expectations for Graduate Program Milestones

Graduate Coursework: Performance Requirements - year 1

In order to be in “good standing” following the first semester and to be in “good standing” and stay in the graduate program after the second semester, students must demonstrate excellence in course work by earning an average grade higher than a B (≥ 3.0) in their non-research courses. The following point system is employed to evaluate first year student course grade averages:

- A = 4, B = 3, C = 2, NC = 0

Students whose first semester course grade average is higher than a B (> 3.0) are in “good standing” and can be assigned to a research group after semester 1.

Example:
Semester 1 grades: A, B, B → average = 3.33 (good standing, research sem. 2)

Students achieving a B average in first semester courses (= 3.00) can be assigned to a research group but will be placed on probation with “warning” status (see Graduate Student Review (above)). During semester 2, these students must make good progress in research, meet the course grade standard (> 3.0 average in all non-research courses) and teaching standards.

Example:
Semester 1 grades: A, B, C → average = 3.00 (probation, warning status, research sem. 2)

All students entering semester 2 on probation must achieve a grade average > 3.0 (higher than a B) in their combined first and second semester non-research courses in order to continue in the program beyond semester 2.

Example 1:
- Semester 1 Grades: NC, A, A → average = 2.67 (probation, warning status, no research sem. 2)
- Semester 2 Grades: B, A, A (all non-research courses) → cumulative average = 3.17
  ➔ Good standing: Can join research group after sem. 2

Example 2:
- Semester 1 Grades: C, B, A → average = 3.00 (probation, warning status, research sem. 2)
- Semester 2 Grades: B, A (non-research courses) → cumulative average = 3.20
  Also good progress in research ➔ Good standing.

Example 3:
- Semester 1 Grades: NC, B, A → average = 2.33 (probation, warning status, no research sem. 2)
- Semester 2 Grades: B, A, A (all non-research courses) → cumulative average = 3.00
  ➔ termination status: dismissed from graduate program

A student entering Semester 2 in “good standing” but earning semester 2 grades in non-research courses that lower her/his average to a B or lower (≤ 3.0) will be placed on probation with “warning” status at the end of semester 2. This student will be asked to leave the program.
after semester 3 if she/he does not satisfy the cumulative exam requirement by the end of semester 3 (see cumulative exams requirements in the appropriate section, below).

**English as a Second Language (ESL): Performance Requirements - year 1**
The department requires a minimum test score of “3” by the end of semester 2 for continued financial support.

**Research**

**Research: Performance Requirements - Semesters 2 - 10**
The most important component of a student’s doctoral education is independent research. Without a strong record of independent research and analysis, there is no PhD. The majority of a student’s research education and training as a professional scientist occurs through interactions with her/his research advisor and research group. These discussions should make clear to each student those aspects of her/his research that are progressing well and those aspects that require improvement. Faculty provide formal assessment of student research progress at the Graduate Student Review following each semester.

**Research Reports**
Each student is required to prepare brief reports on the progress of her/his research. Such reports can be very valuable to the student and to the faculty. This set of such reports simplifies the process of writing a thesis and papers. In addition, it is valuable to the faculty by providing a convenient source of information about what work each student is doing. Your faculty research advisor will establish a schedule of research reports.

**Thesis Committee** - Each student has a Thesis Committee (research advisor and at least two other chemistry faculty) that tracks student performance and progress toward the PhD. The Thesis Committee interacts with the graduate student at a number of graduate program milestones, during which it assesses the student’s progress toward becoming an independent scientist and provides her/him with multiple opportunities to engage in scientific dialogue and to receive feedback, comments and suggestions. The DGS assigns Thesis Committees for Inorganic and Organic students. Physical students are responsible for assembling their Thesis Committee by the end of semester II.

**Cumulative Exams, Research Project Defenses and Original Research Proposals (Yrs 2,3)**
During semester 3, all students take four cumulative exams, two of which must be in their area of research focus. The cumulative exams (“cumes”) are designed to provide continued stimulus for independent study and to encourage familiarity with the current chemical literature. Inorganic and organic students must successfully complete a Research Project Defense (RPD - below and Appendix II) during their fourth semester in the program and develop and defend an original research proposition (ORP - below and Appendix III) during their fifth semester in the program. Physical chemistry students must develop and defend an ORP before they graduate, usually in their fifth semester. Information about the RPD and ORP is provided below. Students are admitted to candidacy for the PhD once they have completed the above milestones along with teaching, seminar and course requirements.
Admission to Candidacy for the PhD
Chemistry graduate students are admitted to candidacy for the PhD once they have completed successfully the formal departmental requirements summarized above. Following admission to candidacy, students must advance their research, prepare, submit and defend their PhD thesis and professionally perform all assigned teaching responsibilities.
Requirements for Organic Chemistry Graduate Students

Organic students are required to take four cumulative exams in semester 3, complete a research project defense (RPD) during semester 4 and prepare and defend an Original Research Proposal (ORP) during semester 5.

Organic Cumulative Examinations
Four cumes are given in the fall semester of the student's second year (Semester 3). The four cumes cover the following topics: kinetics, mechanisms, arrow pushing, spectroscopy, synthesis and methodology, and bioorganic chemistry. The cumes not only test the student’s mastery of the topics but also her/his ability to critically analyze problems in each of these areas. A student must pass a total of three cumes in order to satisfy the cume requirement. Cumes are given from 10:00 AM – 12 noon in GeoChem 351 on the first Saturday of each month (second Saturday in September) during the fall semester.

A student who passes zero cumes in the first four attempts will be asked to leave the program at the end of the spring semester of her/his second year. A student who passes one or two cumes in Semester 3 will be put on academic probation (warning status) and must continue to take cumes in the following fall (Semester 5) until s/he passes a total of three cumes. A student who does not pass three cumes by the end of Semester 5 will have no guarantee of support from the department and will be asked to leave the program.

Research Project Defense (RPD)
Each student must present a research project proposal and defense in Semester 4, typically the spring of her/his second year in the program. This consists of a written report in the format of a proposal, followed by an oral examination by the student's three-member Thesis Committee.

The written research project report must be submitted to the committee by Feb 1. The student will then make an oral presentation of her/his research progress and future plans. This presentation must be completed by March 30. The responsibility for scheduling the RPD in a timely fashion lies with the student; please notify the Graduate Program Administrative Assistant of the scheduled defense.

After the oral examination, the committee will approve, reject, or recommend revisions of the RPD. If the committee does not approve the RPD, the department will not guarantee support after Semester 4, and the student will be asked to leave the program. If revisions are requested, these must be submitted within two weeks of the date of the oral examination. Successful completion of the RPD is required in order to remain in good standing within the graduate program. Students on academic warning as a result of poor cume performance must provide compelling evidence of excellence in the execution and analysis of their research during their RPD in order to continue on into Semester 5. If the RPD is successful, students will remain on academic warning until a total of three cumes are passed.

For more information on the preparation of RPDs, please refer to Appendix II.

The combination of cumes and RPD in Year 2 encourages the student to engage actively with her/his individual research project at an early career stage and focuses attention on both research accomplishments and the critical analyses that accompany execution of experiments.

Original Research Proposal
See Appendix III for information about the original research proposal.

Seminar Presentations
Organic graduate students present seminars in semester 2 and year 4 (thesis research project(s)).
Requirements for Inorganic Chemistry Graduate Students

Inorganic students are required to take four cumulative exams in semester 3, complete a research project defense (RPD) during semester 4 and prepare and defend an Original Research Proposal during semester 5.

Inorganic Cumulative Examinations
The cumulative exams are offered on the first Saturday of each month starting in September (second Saturday in September) and ending in December. The topics include organometallic chemistry, physical inorganic chemistry, coordination chemistry, and nanoscience. Specific topics and suggested materials to study will be provided two weeks before the first examination.

Students must pass 3 of 4 cumulative exams to remain in good standing. Additionally, particularly poor performance on ANY exam may result in the student being required to take a remedial course in that subject matter. A student who passes zero cumes in the first four attempts will be asked to leave the program at the end of the spring semester of her/his second year. A student who passes one or two cumes in Semester 3 will be put on academic probation (warning status) and must continue to take cumes in the following fall (Semester 5) until s/he passes a total of three cumes. A student who does not pass three cumes by the end of Semester 5 will have no guarantee of support from the department and will be asked to leave the program.

Research Project Defense (RPD)
Each student must prepare and defend a research project proposal in their fourth semester. The Research Project Defenses consists of a written report in the format of a proposal, followed by an oral examination by the student’s Thesis Committee. The written research project report must be submitted to the committee by Feb 1. The student will then make an oral presentation of her/his research progress and future plans. This presentation must be completed by March 30. The responsibility for scheduling the RPD in a timely fashion lies with the student; please notify the Graduate Program Administrative Assistant of the scheduled defense.

The proposal must be prepared in accordance with the guidelines for ACS PRF Type-DNI "Starter" Grants. **Submissions, which do not satisfy these criteria, will be returned for revision.** Questions about the requirements should be directed to the research advisor or committee members.

The RPD provides students the opportunity to present their research accomplishments and to formulate future research plans after having spent a little over a calendar year in a research group. The RPD provides valuable experience in written and spoken communication skills.

After the oral examination, the committee will approve, reject or recommend revisions of the RPD. If revisions are requested, these must be submitted within two weeks of the request. If the committee does not approve the RPD, the department will not guarantee support after Semester 4, and the student will be asked to leave the program. **Students on academic warning as a result of poor cume performance must provide compelling evidence of excellence in the execution and analysis of their research during their RPD in order to continue into Semester 5.** If the RPD is successful, these students will remain on academic warning until a total of three cumes are passed.

Original Research Proposal
See Appendix III for information about the original research proposal

Seminar Presentations
Inorganic graduate students present one seminar per year on their thesis research project(s).
Requirements for Physical Chemistry Graduate Students

Thesis Committee
Prior to the start of the second year, physical chemistry students should speak with their advisors to identify candidate faculty members to serve on their Thesis Committee. This committee will follow student’s progress for a number of years, including attending student seminars, evaluating the student’s original research proposal (ORP) and the student’s doctoral thesis. Each committee should include three faculty members: the advisor, at least one additional physical chemistry faculty member and a third faculty member. In most cases, at least two members of the Thesis Committee should be from chemistry.

Students are responsible for asking faculty to serve on their Thesis Committee. Once all members of the committee have agreed to serve, the student should email the names of their committee to the Graduate Program Coordinator and the Director of Graduate Studies.

Physical Cumulative Examinations
Cumulative examinations will be on the following topics: Thermodynamics; Quantum Mechanics; Statistical Mechanics; Spectroscopy (including non-linear and time-resolved spectroscopy). Each cume is graded on a scale of 0 to 25 points.

To remain in ‘good standing’ the sum total of all four cumes must reach 60 out of the attainable 100 points. Students who achieve this threshold have satisfied the cumulative exam requirement and advance to candidacy once they have successfully defend an ORP and made good progress in research.

Students who do not achieve the required points will be placed on “warning”, and will receive a letter indicating that departmental support may not be available beyond semester 4. That is, there will be no departmental obligation for support through a TA position or a fellowship. Support for semester 4 may, if agreeable, be available through the research group, or, if the Department has a need for TA’s, through teaching positions. The decision for such support rests with the research advisor and the department chair, respectively.

In order to quickly re-establish good standing, students are given the following opportunities:

1. Upon request by the affected student(s), make-up cumulative exams will be administered during the third week of January. Higher points will substitute for a lower score in a cume of the same topic, and count toward the cume total. If a total of 60 points is reached, the student returns to good standing. Students need to submit requests for specific make-up cumulative exams by the end of the second week of January.

2. Students may request an exception to the 60 point threshold. Any such request must be based on clear evidence of research accomplishments since joining the department. Evidence can include authorship or co-authorship in a paper, significant theoretical derivations, writing of an extensive computer code, construction of an apparatus, performance of an exceptional experiment, or other achievements that indicate independence and excellence in research. The student will remain on warning for semester 4. To obtain the exception, a student must showcase her/his research accomplishments in a brief presentation in front of the Physical Chemistry faculty, who then vote on granting the exception. The presentation must be made by May 1 of semester 4, and a decision regarding continuation in the program will be made by May 31.
Seminar Presentations
In semester 3 or 4, physical chemistry graduate students are required to present a Tea Session Seminar describing the student’s research plans and progress.

Original Research Proposal
Physical Chemistry graduate students normally prepare and defend their research proposal in semester 5, but arrangements can be made with the research advisor and the graduate representative for a different time.

The ORP abstract should be submitted to the Thesis Committee and Rose Barreira by Sept. 7th (or the closest weekday). Upon acceptance of the abstract by the ORP committee, a full research proposal will be written. An oral defense needs to be completed by the end of the semester. See Appendix III for information about the original research proposal.
The Thesis

The central theme of graduate education is the completion of a doctoral dissertation, or thesis, embodying original research. Most of a graduate student's time will be devoted to thesis research, particularly after the first year. In the following sections, some of the procedures related to thesis research are discussed.

Defense of the Thesis.

When a student has completed a written dissertation in a form considered acceptable by the supervisor (this need not be the final version, but it should be the finalized draft), one copy should be provided to each of the Thesis Committee members. Although it is not required, a reader from outside the Chemistry Department may be invited to participate in evaluating the thesis. An electronic copy of the thesis, along with a brief abstract, should be deposited with the Graduate Program Administrative Assistant for the convenience of any other members of the faculty who may wish to read the thesis prior to the oral examination. For a degree that is to be awarded in May, the Graduate School deadline for submission of the thesis and all associated forms and documents related to the completion of a PhD is the first business day in May. The Graduate School sends to any reader who cannot be present at the oral examination a form on which to record a formal report. In the usual case, a thesis will be approved subject to minor revisions, thanks to earlier discussions with the advisor and readers. In the rare case that readers request substantial alterations, the thesis advisor and the student must come to an agreement on what must be done, with the mediation of the Department Chair if necessary.

After the final draft has been approved by the thesis supervisor for submission to the readers, the student should consult with the Graduate Program Administrative Assistant and the Thesis Committee members to set a time and place for the oral examination. Normally, the thesis defense cannot be scheduled earlier than two weeks following submission of the final draft in order to give the readers ample time to review the thesis. A presiding officer will be designated for the examination. Arrangements will then be reported to the Graduate School, which will confirm the date and time to all concerned.

After the defense of the thesis, the thesis supervisor is responsible for returning the Report of the Final Examination to the Graduate School. The candidate then makes any final corrections in the thesis, and delivers the two-signed copies to the Graduate School, no later than 20 days before Commencement. A finalized electronic copy, labeled with the student’s name, advisor and graduation year should be provided to the Graduate Program Administrative Assistant. The Graduate School is responsible for checking the thesis for completeness and for seeing that any corrections requested by the readers in their reports have been made.

Prizes and Awards

There are five major prizes and awards given to chemistry graduate students in May. The recipients of each award are discussed and voted on by the faculty. In addition to the public recognition of achievement, each prize carries a monetary award for the student and in the case of the Potter Prize a monetary award for the research advisor.

Potter Prize

Students completing theses judged to be of outstanding merit are eligible for the Potter Prize. This prize, awarded annually, goes to the best chemistry PhD dissertation of the year.
William T. King Prize
The King Prize recognizes outstanding performance as a teaching assistant during the academic year. The prize may be awarded annually to one or two graduate students whose efforts as a teacher and facilitator of chemical learning go beyond normal expectations.

Sigma Xi Award for Excellence in Graduate Research
The Sigma Xi Award for Excellence in Graduate Research recognizes outstanding research accomplishments during a graduate student's career. Students in their last year of graduate study are eligible.

Dissertation Fellowship
Each academic year the department endeavors to provide one or two dissertation fellowships. Students in their last year of graduate study are eligible for nomination.

Elaine Chase Leadership and Service Award
This award recognizes the student whose extraordinary leadership and service contributions during her/his years at Brown improved the department or the academic and educational experiences of students.

Post PhD Placement
Placement of PhDs is accomplished in a number of different ways, through:
1. Faculty contacts with industry, government laboratories and other universities;
2. Following up notices of job openings appearing in C&E News;
3. Responding to job listings posted on the main (2nd floor) bulletin board;
4. Web resources (e.g., www.chemjobs.net/chemjobs.html)
5. Interviews with industrial representatives visiting Brown or at ACS meetings;
6. Letter-writing campaigns by the student.
7. Career Services (careerd development.brown.edu)

The old adage concerning distribution of eggs among baskets applies particularly to job hunting. The more avenues of approach tried, the more likely it is that a desirable job will be obtained. A student should begin thinking about job hunting during her/his third year. It is critical that students have serious talks with their research advisors and take advantage of any industrial interviewers who come to Brown. Start reading C&E News carefully and make a point of regularly going through the jobs posted on the main bulletin board on the 2nd floor.

About 9-12 months before the completion of PhD work, start the operation in earnest. Draw up a curriculum vita (see the Graduate Program Administrative Assistant in GC201 for samples), start writing letters of inquiry to places both desirable and of only marginal interest. Don't sit around waiting for lightning to strike. The jobs are there but salesmanship is the key.

A student’s job chances may well depend on her/his ability to expand areas of interest and knowledge outside the immediate area of the thesis. A wide-ranging reading program (continuing after cumes) will pay dividends.
**Student Rights and Responsibilities**

As a member of the Chemistry Department and the Brown University community there are expectations regarding your behavior. It is your responsibility to be aware of the Principles of the Brown University Community. These can be found at the Student Rights and Responsibilities web site: [http://www.brown.edu/Student_Services/Office_of_Student_Life](http://www.brown.edu/Student_Services/Office_of_Student_Life). The Standards of Student Conduct are included in Appendix IV.

**Social Events**

The Department hosts a number of social events planned and coordinated by the graduate students. These include a poster session in the fall, a Holiday Party in December and a picnic/cook-out.

Senior graduate students are invited to dinners honoring the invited guests following Appleton and Clapp Lectures. It is a department tradition that a graduate student arranges a thesis defense party following the successful defense of her/his thesis.

**Vacation**

*All vacation time must be cleared with a student’s research advisor.* It is also imperative to inform the Graduate Program Administrative Assistant of the anticipated time away from the University. The annual amount of time that can be taken is up to individual research supervisors but as a guideline 2-3 weeks may be deemed reasonable.
Administrative and Support Staff and Facilities

Departmental Administrators and Non-Academic Staff

The Chemistry Department has a Chair and, at any one time, approximately 20 non-academic staff that oversee and perform the various operations of the department. Following is a listing of the current non-academic staff and brief job description.

Matthew B. Zimmt, Chairman (2010 - ) (GC 201). Oversees the departmental administration, presides over the chemistry department faculty meetings, and is responsible to the University administration for the overall operations of the Department of Chemistry.

Lynn M. Rossi, Academic Department Manager. (GC 201). Assists the Chair in day-to-day management of the department, oversees instructional, research and general departmental expenditures to ensure that they stay within the budgeted amounts, and manages non-academic staff.

Sheila Quigley, Department Coordinator (GC 201). Responsible for faculty appointments, (including all postdoctoral researchers and visiting faculty), personnel records, textbook purchasing, building access and management of administrative staff.

Stacey Soares, Financial Coordinator (GC 201). Responsible for room reservations, oversight of daily financial transactions, trouble-shooting copier problems and directing general traffic flow through department.

Rose Barreira, Graduate Program Coordinator/Financial Assistant (GC 201). Responsible for maintaining the records of incoming, present and former graduate students, processing of graduate student applications and scheduling the graduate student orientation week. Assists in financial management of the department.

Megan Bucka, Administrative Assistant (GC 239). Provides general administrative support to third floor faculty. Coordinates department seminar series and special events.

Amanda Figgins, Administrative Assistant (GC 239). Provides general administrative support to fourth floor faculty. Coordinates departmental faculty searches.

Carol DeFeciani (Geo-Chem 229) and Margaret Doll (GC 166). Computer Coordinators. Responsible for maintaining, upgrading and troubleshooting all aspects of computing in the department. See “Computing in the Chemistry Department” section of the Handbook for a full description.

Eric Friedfeld, Manager, Technical Services (GC 221). Responsible for the management of the stockroom, department purchasing and safety issues. Robert Wilson and Allen Sylvia assist Mr. Friedfeld, students and faculty with purchases, ordering and shipping activities.

John Geleney, Manager, Undergraduate Laboratories (MM 217). Responsible for the setup of the undergraduate laboratories. Works directly with Teaching Assistants to assure that these
laboratories operate as smoothly and safely as possible. **Fred Guerzon** assists Mr. Geleney in operating the MacMillan Labs.

**Ken Talbot, Technical Supervisor - Machine Shop** (GC 213). The Machine Shop provides technical support, instrumentation design and fabrication for research groups. Some machine and hand tools are available for student use in the student shop adjacent to the main machine shop. Please consult Machine Shop personnel for instruction before the start of any project. **Randy Goulet** assists Mr. Talbot in providing Machine Shop services to the department. Students wishing to use equipment in the student machine shop or in the glass shop should contact Mr. Talbot.

**Al Tente, Electronics Technician** (GC 321). The Electronics Technician is available to assist in the design and fabrication of electronic circuits associated with the test and measurement research projects as well as service and repair electronic equipment in the Chemistry Department. The electronics shop is open to the students and faculty for the design fabrication of electronic equipment. Mr. Tente serves as the primary contact with Facilities Management. All problems with building services, structure, HVAC or electrical systems should be reported immediately to Mr. Tente (Alfred_Tente@Brown.edu).

**Russell Hopson, PhD, NMR Facility Supervisor** (MM 311). Responsible for the maintenance and supervision of the four high field NMR spectrometers in the department. Additionally, the NMR Facility Supervisor provides routine and advanced NMR training sessions and is available for consultation regarding any NMR related questions. New students are required to undergo NMR training prior to obtaining access to the NMR spectrometers. If problems develop while you are using an NMR spectrometer, please report it to the supervisor as soon as possible and document the occurrence in the logbook located next to each spectrometer. Emergency contact information is located next to each spectrometer. Detailed information on how to run routine and advanced NMR experiments and information on NMR training sessions is located at: [http://www.chem.brown.edu/facilities/NMR/nmr.html](http://www.chem.brown.edu/facilities/NMR/nmr.html)

**Tun-Li Shen, PhD, Mass Spectrometer Specialist** (MM 313). Responsible for maintaining and supervising the use of the mass spectrometry facility, which is located in GeoChem 408. For routine MS analysis, contact the MS Specialist to discuss specific research needs. Each user will complete a "Request for Mass Spectrometry Analysis" form (available in GC 408) with detailed information about a particular mass spec sample. FAB, EI or ESI high resolution mass spec (HRMS) measurements are performed by the MS Specialist. MALDI, bench-top ESI and GC-MS instruments are available for graduate students and post-docs to carry out analysis on their own. In these instances, a short training session is required before signing up for blocks of time to use the instrument. Additional Mass Spectrometry information is located at: [http://www.chem.brown.edu/facilities/mass_spec/mass_spec.html](http://www.chem.brown.edu/facilities/mass_spec/mass_spec.html)
Departmental Services

Copying Machines. The department copy machines are located in GC 257 and GC 439. The GC 257 copier is a full function copy machine equipped with a collator, stapler, fax and PDF functions. The use of transparencies is not allowed on this copier. There is also a full function copy machine in GC 439. Transparencies may be used in the GC 439 copy machine. Access to the copier requires the use of the 4-digit code that is available from the Stockroom Manager or a research advisor. For maintenance and service problems, contact Eric Friedfeld (x3-3179). Copy machines are to be used for departmental purposes only.

FAX Machines. There is a FAX machine located in GC 239. Fax machines are to be used for departmental purposes only.

Mail. Incoming mail is distributed to the boxes in GC 257 daily—approximately 9:00 AM. Outgoing mail may be placed in the tray atop the mailboxes. The department will pay the postage on mail directly related to research, but not for personal mail.

Telephones. Telephones for graduate student use are located in the various research laboratories. These telephones are restricted to local (i.e., non-toll) calls. If a toll call related to research is necessary, use the advisor’s long distance code or her/his office telephone. Telephones are to be used for departmental purposes only.

Keys and Card Access. Each student is issued a lab/office key and card access to the GeoChem and MacMillan buildings. See Sheila Quigley (GC 203) for after hours building card access and GeoChem keys. See John Geleney (MM 217) for keys allowing access to the NMR in MacMillan Hall. Keys no longer needed should be returned promptly. Any loss of a key should be reported immediately.

Lounge. GC 349 is the departmental lounge. The department provides a microwave oven, and refrigerator. Please do your part to keep the lounge area neat and clean. The only regularly scheduled time that the lounge will not be available is Wednesdays from 4-6:00 PM during the academic year. In addition, some research groups use GC 349 for group meetings.

Pets in the Department. It is the policy of the Department of Chemistry that pets or other animals are prohibited from all laboratories, offices, seminar rooms and classrooms at all times. This prohibition does not apply to laboratory research animals to be used in accordance with relevant Federal, State and University regulations.

University Services

Graduate students will occasionally have need of services or supplies not available in the Department. Some possible sources within the University are mentioned below.

The Bio-Med stockroom carries some items not found in the chemistry stockroom. Please talk with Eric Friedfeld (x3-3179) or your research advisor concerning purchasing privileges at the Bio-Med stockroom.
The University offers **extensive computing resources**, from personal computers to work stations to mainframes, as well as links to remote supercomputing facilities. A description of some of these resources is listed in “Computing in the Chemistry Department” section of this handbook. For further information, contact the Computing Coordinators.

The **Facilities Service Response** number is x 3-7800. They should be called for building related problems after-hours. During business hours, please contact Alfred Tente (x3-9385).

**Counseling and Disability Support Services**

During the course of one’s graduate career, a variety of concerns (academic, professional, and personal) may arise that interfere with productive and timely academic efforts. There are many people in the university who are trained and available to discuss and to help resolve these concerns. These people include the Office of Student Life (x 3-3145), the staff at Psychological Services (x 3-3476) and the Office of the Chaplain (x 3-2344). These individuals engage in confidential discussions of matters that may be affecting students’ lives and work.

In some cases, circumstances may lead to the development of or trigger physical, psychological, sensory or learning disabilities. Brown University’s office of Student and Employee Accessibility Services (SEAS - formerly Disability Support Services) offers assistance to undergraduate, graduate and medical students with disabilities. The office provides counseling, guidance in the development of self-advocacy skills and other services.

SEAS also assists in determining what accommodations can be made to help students achieve their educational goals. The office does not impose accommodations on students. However, if a student wishes to seek accommodations, the first step is to register with the SEAS office. All conversations and interactions with the office are confidential. Students with questions about registering and / or accommodations are encouraged to contact SEAS for a confidential review of the available options (www.brown.edu/Student_Services/Office_of_Student_Life/dss/).
Safety and Security Guidelines

The most up to date information related to safety at Brown University is located at the Environmental Health and Safety (EHS) website: http://www.brown.edu/Administration/EHS/

This website details information relating to safety guidelines, regulations and training. It is each student’s responsibility to carefully read the Chemical Hygiene Plan and Laboratory Safety Manual: http://www.brown.edu/Administration/EHS/lab/chp/

An Occupational Safety and Health Administration (OSHA) standard titled "Occupational Exposures to Hazardous Chemicals in Laboratories" was enacted in 1991. This standard requires all organizations with laboratory employees to implement exposure control programs and to convey chemical health and safety information to laboratory employees working with hazardous chemicals.

The standard's intent is to ensure that laboratory employees are apprised of the hazards of chemicals in their work area, and that appropriate work practices and procedures are in place to protect laboratory employees from chemical health and safety hazards. The manner in which Brown University is complying with each of the elements in OSHA's Laboratory Standard is detailed in the Chemical Hygiene Plan & Laboratory Safety Manual (CHP). A copy of the CHP has been sent to each Laboratory Supervisor responsible for a research or teaching laboratory in which hazardous chemicals are handled. In addition, a copy of this standard and its appendices may be obtained by visiting the OSHA's web site at http://www.osha.gov/

The aim of the following information is to highlight and not replace safety information presented on the EHS website: http://www.brown.edu/Administration/EHS/.

Accident Prevention

A gram of prevention in a chemistry laboratory is worth at least a kilo of cure. Careless work or uninformed practices can lead to explosions, electrical shocks, poisonings and other accidents. It is up to each individual to take steps to minimize danger and understand what to do in the case of an accident or emergency. Furthermore, teaching assistants are responsible for the safety of the students working under their supervision. Do not silently tolerate unsafe conditions or practices. If you feel that a situation is dangerous, bring it to the attention of the individual involved, the research group leader or a member of the department Safety Committee.

The detailed standards for chemical exposures, machinery guards, etc. are available on the Environmental Health & Safety website: http://www.brown.edu/Administration/EHS/. A wide variety of resource books are also available in the stockroom, GC 221. Material Safety Data Sheets (MSDS) can be obtained from chemical suppliers for all chemicals purchased and at the following URL: http://www.brown.edu/Administration/EHS/lab/msdsindex.htm. The Office of Environmental Health and Safety strongly recommends that each person read the MSDS of the product that they are using prior to working with it. Extensive references are also available regarding the prudent and safe handling and disposal of chemicals.
DO NOT JEOPARDIZE YOURSELF OR OTHERS THROUGH IGNORANCE. When carrying out a procedure for the first time or working with unfamiliar materials, take the time to familiarize yourself with the properties of the materials you are handling and the recommended procedures for their use and eventual disposal. Each research worker is responsible for being familiar with the following points, and for applying the rules and precautions in a thoughtful way.

ALL EMERGENCIES SHOULD BE REPORTED TO PUBLIC SAFETY AT 863-4111.

Chemical Spill Guidance - In the event of a chemical spill, the following action should be taken:

. Immediately alert all personnel to evacuate the room.
. Once everyone is out close the door behind you.
. Move to a nearby phone and contact Brown University Public Safety at 863-4111.
. Tend to injured or contaminated personnel.
. Stay in the general area, a safe distance away, and wait for emergency responders.
. Make a point to introduce yourself to emergency response personnel so that if they have any questions they know who you are.

. Non-Emergency Situations - To report non-emergency situations to EHS staff or to request assistance from EHS staff during normal business hours, please contact 863-3353. All accidents or injuries occurring should be reported to Sheila Quigley, Department Coordinator (x39618). In addition, any accidents that occur in the undergraduate laboratories (Macmillan Hall) must be reported immediately to John Geleney, Manager of the Undergraduate Labs (x32737) - regardless of how minor it may seem.

Lab Safety Basics

Each lab is equipped with a Chemical Hygiene Plan (CHP) specific to that lab’s environment, equipment and usage. When you join a research group, you will be required to read this plan and sign an acknowledgment that you have understood and will abide by its requirements. Basic lab safety requirements are outlined in Appendix III. Please familiarize yourself with your research labs CHP immediately.

As a member of the Chemistry Department you will be required to take lab safety, hazardous waste materials and other training courses appropriate for your research area through the Environmental Health and Safety. Log on to: http://brown.traincaster.com/ to register for the mandatory safety trainings. The Environmental Health and Safety will provide email notifications when trainings need to be updated – it is imperative that you comply with their requests.
Training Guide

<table>
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<tr>
<th>Type/ Requirement</th>
<th>Attendance Interval</th>
<th>Contact</th>
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<tr>
<td>Laboratory Safety Training is required for any individual working (paid or unpaid) in a Brown University laboratory</td>
<td>Initial training required with in first 3 months of assignment and every 5 years thereafter or as otherwise specified.</td>
<td>Chemical Hygiene Officer 3-1737</td>
</tr>
<tr>
<td>Hazardous Waste Training is required for ALL individuals who generate and/or handle hazardous waste in a research or teaching laboratory</td>
<td>Initial training required within 30 days of assignment and annually thereafter or as otherwise specified.</td>
<td>Environmental Specialist 3-1610</td>
</tr>
<tr>
<td>Radiation Safety Training is required for ALL employees who work with radioactive materials or x-ray machines</td>
<td>Initial training is required prior to working with radioactive materials and every five years thereafter or as otherwise specified.</td>
<td>Radiation Safety Officer 3-1738</td>
</tr>
<tr>
<td>X-ray Safety Training is required for ALL employees who work with x-ray machines</td>
<td>Initial training is required prior to working with and x-ray machine and every five years thereafter or as otherwise specified.</td>
<td>Radiation Safety Officer 3-1738</td>
</tr>
<tr>
<td>Laser Safety Training is required for any operator or user of a class 3b or 4 laser</td>
<td>Initial training and baseline eye exam is required prior to working with a Class 3b or 4 laser and every five years thereafter or as otherwise specified.</td>
<td>Radiation Safety Officer 3-1738</td>
</tr>
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</table>

Working Alone

Faculty, Postdoctoral Associates and Graduate Students may work alone in areas other than offices provided the following minimum safety criteria. EHS policy states: Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous. Undergraduates. Under no circumstances is an undergraduate permitted to perform laboratory work without immediate supervision by a faculty member or other authorized person.

Unattended Reactions

Water hoses. All water hoses on distillation apparatus must be secured with copper wire or (preferably) clamps. If a reaction must be run overnight unattended, automatic shutdown valves and switches must be installed.

Emergency telephone numbers. Contact public safety for all emergencies; 3-4111. Each laboratory must have posted an Emergency Telephone Number Card listing whom to call in case of emergency.
Personal Safety Equipment

Eye Protection
Rhode Island State law requires all workers in laboratories (including students and visitors) to wear adequate eye protection. Goggles, which give complete protection, are best, and should be worn in all situations known to be hazardous. Ordinary safety glasses with side shields should be worn at all other times in the laboratory. If you normally wear prescription glasses, you should have safety glasses ground to your prescription. In experiments involving any suspected risk of explosion, a safety shield should be used in addition to goggles. Lanyards for safety glasses are available in the stockroom.

Safety glasses are available from the stockroom or from our blanket vendors such as VWR and Fisher Scientific. Prescription glasses can be obtained from the EHS (4th floor, Brown Office Building).

Face shields for graduate research are available from the stockroom. These should be used in addition to your personal safety glasses when needed.

EBA, Emergency Breathing Apparatus. This device is a tight-fitting facemask and 7 minute cylinder of breathing air. There are four in the department, located in Rooms 203, 15, 129 and 231. Any situation requiring such apparatus must be handled by EHS!

Acid impervious aprons can be purchased from the stockroom. These are for graduate research only.

Fire Prevention
Don't wait until you have a fire to learn the location of fire extinguishers, safety showers, exits and fire alarms. Please note all laboratory doors must be closed at all times to ensure the proper operation of the fume hoods.

Location of Fire Alarms.
Fire alarm boxes are positioned throughout the building. Make sure you know where the one nearest your laboratory is located. Most laboratories also have heat detectors mounted on the ceiling, which trigger the fire alarm if heated. The alarm system, however triggered, summons Brown Security and the Providence Fire Department. It does NOT summon the Providence Rescue Squad. When an alarm sounds, stop what you are doing as quickly and safely as possible and leave the building by the shortest route.

Exit Routes.
Plan your exit routes in case of emergencies. Anticipate possible locked or blocked doors.

Use of Fire Extinguishers.
Learn the location of the nearest fire extinguisher and how to use it. These devices are typically located at the exit of the laboratory. If you have never used a fire extinguisher, read the instructions on an extinguisher now. Demonstrations of fire extinguishers are held in the fall in connection with teaching assistant orientations. Note: it is Brown University's policy that one is never required to use a fire extinguisher.
Metal Fires.
Treated sand for smothering metal or metal-hydride fires is available from the stockroom. Obtain some before using metal compounds such as lithium aluminum hydride, sodium or potassium borohydride, sodium, potassium, lithium, etc. Never use water on solvent or metal fires. Distillations using reducing metals must be carried out only in those hoods located near a 50 lb. Class D fire extinguisher. The hoods must be cleared of other flammables before beginning the distillation.

In Case of Fire

1. **Small Fires.** If the fire is confined to a wastebasket or sink, put it out with the appropriate fire extinguisher.

2. **Large Fires.** If the fire looks at all unconquerable with the use of only one fire extinguisher,
   a. Shout a warning and call Brown Emergency at x34111.
   b. Pull the nearest fire alarm.
   c. Send someone to meet the firefighters to show them where the fire is;
   d. Alert all people in the immediate area;
   e. Confine the fire by closing doors, and
   f. Then, if there is still time, try to extinguish it with available equipment. Always position yourself between the fire and an exit so your safety and exit strategy is assured.

3. **Refilling Used Extinguishers.** It is your responsibility to notify the stockroom of partially used or empty fire extinguishers for refilling. The University Fire Marshal’s office requires a written statement of why the fire extinguisher was used.

Chemical and Other Common Hazards
Know the toxicity, flammability and explosive hazard of the chemicals you are working with before you begin work. Once you know what you are working with, it is your responsibility to take steps to ensure your own safety and that of others in the laboratory. The following books are kept in GC 221 and should be consulted for information on safe handling practices, safe and environmentally sound disposal, questions of toxicology, etc.:

- "Prudent Practices for Handling Hazardous Chemicals in Laboratories"
- "Safety. Sigma-Aldrich Library of Safety Data” NIOSH Registry of Toxic Effects of Chemical Substances"
- "Dangerous Properties of Industrial Materials", Sax,
- "Clinical Toxicology of Commercial Products", Gleason, et al,
Material Safety Data Sheets (MSDS) for individual chemicals are available upon request from suppliers and are typically available on their web sites. Additional references are available in the Environmental Health & Safety (EHS) office (4th floor, Brown Office Building) as well as their website: http://www.brown.edu/Administration/EHS/

**Toxicity**
It is your responsibility to consult the NIOSH Registry when signing out chemicals from the stockroom. A copy is kept at the sign-out window. Your signature is required in the appropriate space on the sign-out card. Any new or unknown substance not referenced in the chemical literature must be treated as potentially highly toxic.

**Carcinogens**
Many cancer-causing chemicals (carcinogens) and cancer suspect agents are under strict governmental control. The current list of those controlled includes:

<table>
<thead>
<tr>
<th>Acetylamino fluorene</th>
<th>4-Dimethylaminoazobenzene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile</td>
<td>Diphenylhydantoin(Phenytoin, Dilantin)</td>
</tr>
<tr>
<td>Aflatoxin B2, G1</td>
<td>Ethyleneimine (Aziridine)</td>
</tr>
<tr>
<td>4-Aminodiphenyl</td>
<td>Hydrazine</td>
</tr>
<tr>
<td>Arsenic (inorganic)</td>
<td>Melphalan</td>
</tr>
<tr>
<td>Auramine</td>
<td>Methyl chloromethyl ether (CMME)</td>
</tr>
<tr>
<td>Benzene</td>
<td>4,4'-Methylene-bis(alpha chloroaniline) (MOCA)</td>
</tr>
<tr>
<td>Benzidine and salts</td>
<td>Alpha and Beta Naphthylamine</td>
</tr>
<tr>
<td>N,N-bis(2-chloroethyl)-2-naphthylamine</td>
<td>4-Nitrobiphenyl</td>
</tr>
<tr>
<td>Bis-(chloromethyl)-ether</td>
<td>N-Nitrosodimethylamine</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>2-Oxetanone, (Beta-Propiolactone)</td>
</tr>
<tr>
<td>1,2-Dibromo-3-chloropropane (DBCP)</td>
<td>Oxymetholone</td>
</tr>
<tr>
<td>3,3'-Dichlorobenzidine and salts</td>
<td>Phenactin</td>
</tr>
<tr>
<td>Diethylstilbestrol</td>
<td>Vinyl chloride (Chloroethylene)</td>
</tr>
</tbody>
</table>

Controlled compounds bear a warning label and require specific disposal procedures OSHA have set maximal concentrations (threshold limit values, TLV) for many controlled and uncontrolled compounds in air. These are published in the NIOSH Registry. Students should reduce exposure to these compounds by wearing gloves and working in a fume hood. Consult your advisor about specific compounds.

A complete list of category I carcinogens (principally those that have caused cancer in two or more animal species), regulated (controlled) carcinogens, teratogens (chemicals that cause birth defects), poisons, and compounds with serious cumulative toxicity is available in the stockroom office.
Many other compounds have recently been identified as causally related to cancer or other important human and animal illnesses. Stockroom lists are continually updated, but the best precaution is to check the published literature (MSDS) on any compound in use. Avoid those that can be replaced by less dangerous ones, and use them only with proper precaution. If you find a potential conflict between your work and your health, point it out to your professor and to the Safety Committee so that something can be done to enable you to work safely.

**Carcinogenic materials may not be used in the Undergraduate Instructional Laboratories.**

If you are aware of any violations of this rule, you should report this information to Prof. Suggs, Chair, Safety Committee or the department Chairman.

**Explosives**

The possibility of explosion must be carefully considered. Any reaction that releases more than about 0.1 kcal of heat per gram of reactant is potentially explosive. The most common hazards are combustion reactions and reactions that produce nitrogen. Solvent vapors and dusts are particularly dangerous. The following compounds are now listed, as explosive - the use of these compounds in the Chemistry Department will be restricted:

- 2,4-dinitrophenylhydrazine
- Picric acid
- Hydrazine Hydrate
- Trinitrobenzene
- Acetyl peroxide
- Peroxyformic acid
- Azide salts

**Flammability**

Do not work with open flames any more than necessary and when doing so clear the area of flammable material.

**Storage of Chemicals**

Flammable solvents should be kept in relatively small amounts and, whenever possible, stored in safety cans or approved solvent storage cabinets. Never leave glass jugs of solvents on the floor where they can be kicked accidentally. Use common sense on chemical storage. Store your hazardous materials well away from your workspace in a place where they are unlikely to be knocked from shelves or desks. **Always label all containers as to contents and if applicable show hazardous warnings.** This is even true of wash solvents used for cleaning and solvents in plastic spray bottles.

**Disposal of Chemicals**

According to State & Federal law all hazardous chemical waste must be collected, labeled and packaged for disposal. All students and faculty are required to complete Hazardous Waste Training every year. Detailed information may be found at the EHS web site at: http://www.brown.edu/Administration/EHS/

Collection of large quantities of chemical waste should be done in 5-gallon or 16-gallon containers available in the chemistry stockroom. Collection of small quantities of hazardous waste should be done in clean and empty amber solvent bottles. Solid wastes can be collected in
1-gallon aluminum paint cans available in the chemistry stockroom. Sink disposal of hazardous waste is strictly forbidden. As soon as waste is added to a container, fill out an orange HAZARDOUS WASTE label (available in the stockroom) and affix it to the side of the container. Labels must be filled out accurately and completely. Abbreviated chemical names or formulas are NOT ACCEPTABLE only full chemical names or product names should be used.

Hazardous Waste containers must be stored in a secondary containment tray at all times to prevent accidental release or spills from occurring. Containers must be closed at all times unless ACTIVELY adding to the container. Once a container is full you should date it, put it back in the secondary containment tray to await pick-up. Full containers will be picked up by an EHS representative twice a week or as requested by calling x33353. If possible, neutralize or destroy any chemical hazard before collecting the waste. There are several Hazardous Chemical Disposal Guides available for reference in GC 221. The unlawful disposal of hazardous chemical waste is a serious offense. Please handle all chemical waste responsibly.

Gas Cylinders
Treat every gas cylinder as a potential bomb! When not in use, keep the caps on. Always have cylinders well secured to a firm support, whether full or empty.

Cylinder carts. Use only the cylinder carts with four wheels for transporting compressed gases. Eight carts are available. When not in use return to the central cylinder storage area in the stockroom.

Safety solvent storage cans with spring loaded caps and fire retardant screens.

Electrical Circuits
Make sure that electrical apparatus is properly grounded. Insulate or enclose all current carrying parts, even if set-up is only temporary. If in doubt, contact the Electronics Technician. When trouble-shooting electrical apparatus, make sure that it is completely disconnected from the power source. But in the cases where it is necessary to work on live circuits, work on a wooden stool and on a wooden bench, and never put both hands in the vicinity of the circuit. Real damage from electrical shock occurs when the current passes through your torso; restricting the exposure to one hand significantly minimizes the danger.

High Pressure and Vacuum Equipment
All pressure and vacuum equipment requires intelligent use to avoid explosion or implosion. Any large glass vessels (Dewars, vacuum desiccators) must be wrapped or enclosed. If a reaction must be carried out in a close system, a safety shield and other reasonable precautions are essential.

Lasers
The one rule to remember about laser safety if you are not actually doing such type of research is DO NOT WALK INTO A ROOM WITH A LASER IN IT. KNOCK FIRST and wait to be let in.

See the EHS Website for more information on Laser Safety:
http://www.brown.edu/Administration/EHS
Radioactive Chemicals and Radiation-Producing Apparatus.
In order to use radioactive chemicals a Radiation Safety License is necessary. This is obtained with the help of the Radiation Safety Officer (x33353); you will be made aware of the various procedures which are required for the acquisition, handling, storage, and safe disposal of radioactive materials and be required to follow stringent record-keeping procedures associated with the above activities. In addition any apparatus that is likely to emit or leak radiation such as x-ray generators or microwave generators must be reported to the Safety Office.

Housekeeping
Attention to the following rules will help to prevent accidents:

1. Keep benches, tables, hoods, floors, aisles and desks clear of all materials not being used.
2. Keep clear and adequate passageway to exits.
3. Keep clear space around safety showers, fire extinguishers, fire blankets, eye fountains, and electrical controls.
4. Keep floors clean of spilled ice, and other small debris that might be a tripping or slipping hazard.
5. Clean up spills and dispose of the materials used to absorb the spill.
6. Remove and dispose of broken glass.
7. Use proper waste-disposal receptacles for solvent, glass, paper, etc.
8. Keep chemical containers clean and properly labeled.
9. Retain only the quantities of supplies needed for current work.
10. Disassemble and return to storage surplus equipment.
11. Hang clothing in its proper place; do not drape over equipment and workbenches.
12. Syringe needles must be disposed of as broken glass, in the labeled containers. If chemical residues are present, they must be disposed of as solid waste. **Under no circumstances can they ever be disposed of in the wastebaskets.**

The Safety Committee

There is a standing Departmental Safety Committee with general responsibility for promoting good safety practices and acting as a liaison with the EHS lab safety staff.

The EHS staff makes frequent inspection tours of all labs and will report any problems to the PI/advisor in charge of that lab. Please remember to report any hazardous situations to your advisor, Prof. Suggs, Chair of the Safety Committee or the EHS office ASAP.

In Case of Injury

If the injury is serious, call Brown Police and Security at x3-4111. Do NOT attempt to move the victim. **Pulling the fire alarm does NOT call the Rescue Squad.**

While waiting for outside help, administer first aid if you are qualified. First aid cabinets are located at various spots in the building, primarily by the freight elevator and bathrooms. Familiarize yourself with their locations and contents-any shortages should be reported to the stockroom. The best first aid for chemical burns or splashes is continuous flushing with copious amounts of water (at least 10 minutes) regardless of the nature of the chemical. Even if a
contaminant is reactive with water, the mechanical action of flowing water will remove it from the body.

In cases of less serious accidents for which treatment is required, go to the Andrews House Infirmary on Brown and Benevolent Streets.

An Accident Investigation Report must be filled in for all accidents, including those that occur during Undergraduate Instructional Laboratories. These forms are available from the stockroom and on the EHS website: http://www.brown.edu/Administration/EHS/

All accidents must be reported to the Department Coordinator as soon as possible.

Security

Petty (and sometimes not so petty) thefts have been a serious problem in the department. Do not leave valuables—purses, wallets, iPods, laptops, pocket calculators, etc. in plain view. Lock such things in desks whenever possible. If you see a suspicious or unfamiliar person contact the Security Office, x33322 as well as the front office, GC201.

Laptops and other portable electronics are prime targets for theft and should never be left unattended in labs or offices. You may purchase a lockdown for your laptop at the bookstore but be aware that these are not foolproof. No lock is guaranteed against the efforts of a determined thief. When you are going to be gone from your workstation for any length of time, it is recommended that you take the items with you or put them away out of sight in a locked desk or file cabinet.

The University does not provide insurance coverage for damage or loss to your personal property, even if it happens on campus. For more information on security and individual insurance for personal property, please visit this website: www.brown.edu/Administration/Office_of_Insurance_and_Risk/ship/property.html

Only individuals associated with the department have a right to be in the building after hours. Do not let unidentified persons into the building. If you have guests in the department you are responsible for their activities while they are on the premises. Never prop the outside doors open at night or open department windows.

Building Maintenance

Facilities issues, from burned out light bulbs and spill clean-ups to plumbing, electrical and air conditioning failures, should be reported to Alfred Tente (x3-9385).for GeoChem and John Geleney (x3-2737) for MacMillan Hall. At night or on weekends you may contact Facilities Service Response directly at x3-7800 for problems that are emergencies or need immediate attention.
Computing in the Chemistry Department
(This section being updated)

*Please note the most up to date computing information is located at http://chemistry.brown.edu/computing.

This section gives a brief description of hardware and software available for computing in the Chemistry Department. For further information, please contact Carol DeFeciani, Department Computer Coordinator (DCC) or Margaret Doll, Scientific Computing Coordinator (SCC). E-mail is the preferred method of contact to request assistance. In a true emergency, you may use the pager numbers listed.

The DCC, Carol DeFeciani, is responsible for maintaining department-owned Windows and Mac computers, the department website and the department stockroom inventory database, as well as printing and networking and IT purchasing recommendations. The SCC, Margaret Doll, is responsible for maintaining UNIX computers and networking, but can also help with Mac and Windows questions as time permits.

Chemistry Department Computing Policy

Windows and Mac computers coming onto the network must have the University’s officially approved anti-virus programs installed, have the latest updates and have the system set up to automatically update the system software and the virus definitions. Currently, Brown’s version of Symantec Norton Anti-Virus is the approved software, but Microsoft Windows Security Essentials will become the approved anti-virus software for Windows computers in the Fall Semester of 2011. ClamXav will become the approved anti-virus software for MacOS.

To complete these steps, the user must:

1. Remove all anti-virus software other than the current version of Brown's Symantec Norton Anti-Virus;

2. Install Symantec Norton Anti-Virus which can be downloaded from: http://software.brown.edu/dist/index.html
   There must be daily automatic updates of the virus definitions on the computer.

3. Install Spybot Search and Destroy on Windows computers from Brown's software download pages: http://software.brown.edu/dist/sw-win.html

4. Manually update the system's critical patches and service packs. On Mac OS X systems the program is under the apple in "Software Updates." On Windows XP it is "Windows Updates" or "Microsoft Updates" located above the "Start" button; and

5. Set the system updates to automatically update daily. For Macs, go under the Apple to "System Preference"/"Software Update". Check "Check for updates: Daily." For
Windows XP go to the "Control Panels"/"Automatic Updates." Check "Automatic (recommended) - Automatically download recommended updates for my computer and install them" choosing "Every day," and set a time for regular daily updates.

All computers will have the strictest firewall definition possible while maintaining the full functionality of the machine necessary for the users' work.

Before connecting to the Chemistry Department, network all computers will be registered in the department's computer database maintained by SCC, Margaret Doll. The SCC will assign the computer a static IP address. The user should e-mail the SCC with the type of computer they are using, the computer's operating system, the room in which it will be used, the user's Auth ID and the account name the user is using on their Windows computer.

Before connecting to the Chemistry Department network all Windows and Mac computers will be checked by DCC, Carol DeFeciani, to ensure that they have met the first three requirements. The SCC, Margaret Doll, will check UNIX computers other than Macs.

System managers, those having admin privileges of any system, must be qualified to manage their system, and must take the responsibility to ensure that the system is in working order and free of programs that are detrimental to the network. System managers must also ensure that their systems are not downloading and distributing illegal software, music, games and videos. System managers take full responsibility for their system. If the system is broken, the system manager fixes the system.

Undergraduates/summer students will not be given administrative privileges as they usually do not have the background in system management and they will not be around long enough to ensure the smooth operation of the system for a long period of time.

The Computer Coordinators under the following guidelines will repair departmental computers:

**Computer Coordinators are responsible for the upkeep of departmentally owned computers**

- In faculty and staff offices.
- That have gone home with faculty or staff members. Work will be done on the computers only when the computers are returned to the department.
- In labs where the administrative account is solely in control of the DCC, Carol DeFeciani/SCC, Margaret Doll.

**Computer Coordinators are NOT responsible for**

- Privately owned computers.
- Any departmental computer in a lab where administrative privileges have been given to a student.

Hardware repair of student computers should be sent to the Brown bookstore. Software repair for student computers should be sent to the Help Desk at CIT. The Computer Coordinators are available for help on student computers only as time permits.

To understand the computing policies at Brown University read the documents link:
http://www.brown.edu/Facilities/CIS/policy/

For examples of acceptable use of computers at Brown, read:
http://www.brown.edu/Facilities/CIS/policy/aup_eg.html

Also read the computer security policy for the department at:

Web information on the computers within the Chemistry Department and at Brown:
http://www.chem.brown.edu/info/computing/computing.htm

Your Responsibilities as a User on the Chemistry Network

When given an account on a computer, do not share the account/password with anyone. Passwords on the UNIX computers within the department may be obtained by e-mailing the SCC, Margaret Doll.

You cannot share copyrighted music, movies, games or software on the Brown campus. This is an illegal activity. Ignorance of the law is not a defense. Please read “Message to the Brown Community on Illegal Downloading “ at:
http://www.chem.brown.edu/info/computing/gencomputing/dl-music+videos.html

Make sure the Administrator account or root account if active has a secure password. A secure password is at least eight characters long. The password does not contain any proper names or words in a dictionary. The password is composed of a mixture of upper and lower case and of alphabetic and non-alphabetic characters.

Be responsible for your data and the data of other users. Be sure to save your files where your advisor indicates you should. On some research Mac or Windows computer being backed up, only the “USER” folder will be backed up. It will be up to the individual to create a subfolder labeled with her/his name inside the USER folder that will be used to store their data.

Be responsible for backing up your data. Some shared computers (for instance the NMR scheduling computer) should not be used for storage of data files. On an intermittent basis and without notice, this computer will be cleared of all miscellaneous files, with no ability to recover files that were inadvertently stored there. Some research computers are backed up during the week. Inquiries about or requests for backups should be sent to the SCC, margaret_doll@brown.edu.

Do not change or delete data files of your fellow users.

Computing and Printing Environment in the Chemistry Department

Computers available to members of the Chemistry Department include a variety of Windows platforms, Mac, and UNIX workstations. The computers are located in public clusters, research rooms, offices and laboratories throughout the department. Nearly all of the computers have
network connections giving them access to departmental printers and file servers, on-line library resources, e-mail, and the World Wide Web.

Departmental printers include an HP LaserJet 4250 (gc-hp257) in GC 257, and a HP Color LaserJet 3800 printer (gc-hp201-color) in the main office, as well as other admin offices. The full listing is maintained on


Printing jobs are routed through CHEMPS. You will need an account on CHEMPS and static IP address to access these queues. The user should e-mail the SCC, MARGARET DOLL, with the type of computer they are using, the computer's operating system, the room in which it will be used, the user's Auth ID and the log on name the user is using on their Windows computer.

The color laser printers are normally set up to print on regular letter-sized printer paper.

If you want to use transparencies on any of the printers, obtain the transparencies from the stockroom. The wrong type of transparency will melt around the fuser in the printer and/or jam. The repair is expensive and time-consuming.

Toner kits and paper are available in the stockroom.

If a printer jam can be easily cleared, do it yourself. “Easily” means that you can safely pull the entire sheet out from under a roller. For difficult jams see the front office or either Computer Coordinator.

If there is a job on the printer spewing out garbage, turn off the printer and report the problem to the SCC, MARGARET DOLL, by pager. The job needs to be taken off the print queue.

If a print job does not seem to be clearing the printers successfully, consult the SCC.
Email: margaret_doll@brown.edu.

**Hardware and Software Care for the Computers**

The University currently provides support for software packages that have been listed on the pages linked to from http://software.brown.edu. University support means that the packages can be installed on any Windows, Mac, UNIX box that is currently on the University subnets. Consultants are available in the CIS building (3-HELP) for the software supported on Windows and Macs. UNIX software consultation is available through the SCC. Certain members of research groups are also invaluable resources for training in the use of available software.

The University also provides hardware support for some current models of Windows, Macs and printers owned by the University. Check with Service & Repair in the CIS building or their web pages for a full listing and current repair pricing. The DCC, Carol DeFecian, handles hardware/software problems on Mac and Windows computers owned by the department. Hardware support for the UNIX computers within the department is provided by individual contracts directly with the vendors. Your research advisor or the SCC should be contacted if a
UNIX computer fails. Do not reset or turn off a UNIX computer unless it is on fire or making noises like the disk bearings have failed.

Do not copy software from one computer to another; all software must be licensed on each computer. Any installation of software on the cluster computers must be performed by the Computer Coordinators or, on research group computers, by a faculty approved and appointed research group member. Software on department-owned machines that is not authorized for use by Brown will be removed. It is illegal to download and/or install unauthorized software to any computer within the Chemistry Department unless you have a receipt of purchase or if the software is freeware.

**Anti-virus and anti-spyware software.**
The University provides Symantec Norton AntiVirus software for Windows and Mac computers connected to our network. During the fall 2011 semester, the anti-virus software will be switched to Microsoft Security Essentials and ClamXav for MacOS. Current updates and use of this software is REQUIRED on ALL computers to be used on the Brown University network. Please be sure that the virus definitions are updated DAILY, downloaded and installed automatically. Leave your virus scanner on so that it scans any new files coming into your computer whether via e-mail, web downloads, FTP, etc. Do a full scan of your disks from time to time. Don’t take a chance on losing your data, your system or your entire hard drive, or on damaging other computer systems on Brown's network by spreading viruses, Trojans, spyware, or adware. Spybot is required on Windows computers.

It is required that you keep the patches for your system up-to-date.

**Department Documentation**

Departmental documentation on computers will be maintained on:

E-mail the Scientific Computer Coordinator for documentation that you would like added to the pages.

**Windows**

The Chemistry Department is using a range of Windows computers from IBM ATs running DOS Windows 95/98, NT, 2000, XP, Vista Windows 7. The computers can be equipped with hard disks, CD drives, DVD drives, RAM and other peripherals.

Brown's Windows software download links are at:
http://software.brown.edu/dist/sw-win.html

These applications are legally licensed by Brown University. You will need your Brown Auth ID to download software from these pages. Some of the software licensed to Brown only operates via a license metering server known as Keyserver. To connect to this server and use the software that is licensed-controlled through it, you will need to install the Keyserver client software on your computer. Do not load software on a cluster computer. Ask a Computer Coordinator to load the software for you. If you are working in a research group, ask your advisor before adding any software to a research computer.
To print from a Windows computer to a departmental printer, you must be authenticated to the Chemistry Department's file and print server known as CHEMPS, a LINUX server. To obtain an account on CHEMPS, please e-mail the SCC. Note: Your password for CHEMPS MUST MATCH your password on the Windows PC from which you are trying to print. The instructions to add a network printer are also listed in the computing documentation on the Chemistry web pages as outlined above.

You are responsible for backing up your own data via CDs, key/pen drives, or external hard drives or to your own computer. CHEMPS can be used as an emergency, temporary backup. You are only allowed to store 100 Mb of data on this server.

Mac

The Chemistry Department also employs a fair number and variety of Mac computers.

You will need your Brown Auth ID to download software from these pages. Most of the software licensed at Brown runs when the computer is attached to the Brown Keyserver. Do not load software on a cluster computers; ask a Computer Coordinator to load the software for you. If you are working in a research group, ask your advisor before adding any software to a research computer.

Mac software download links are at: http://software.brown.edu/dist/sw-mac.html

UNIX

There are UNIX computers in offices and laboratories; the use is usually restricted to work for certain research groups.

NMR experiments run with the use of RedHat LINUX computers in GC 410 and in MM 315. See Russ Hopson with questions regarding training on the NMR equipment and for accounts.

A single-crystal, automated X-ray diffractometer and associated computer programs are available for obtaining crystal structures at both room and low temperatures in GC 419. See Prof. Williard for more information.

For mass spectrometry training, including GC-MS and LC-MS equipment and associated softwares in GC 408, see Tun-Li Shen.

The department has a 72-processor UNIX cluster, a portion of which is available to anyone in the department. The cluster is used extensively by the theoretical-physical chemists in the research groups of Profs. Doll and Stratt. Amber, Comsol, gaussian, gnuplot, matlab, molden, moldy and xmgrace are programs available to other members of the department. Contact margaret_doll@brown.edu for account information and instructions on how to run on the cluster.

http://www.chem.brown.edu/computing/cluster/
Backups of the UNIX computers and some research Macs and Windows within the department are completed nightly over to CCV, Center for Computation and Visualization. Questions concerning backups should go to the SCC.

The software for UNIX computers available through campus agreements include those listed on links from http://software.brown.edu:

http://www.brown.edu/Facilities/CIS/Software_Services/cfarm/index.html

There are numerous packages that also come with UNIX software distribution including media development, compilers, Mac and Windows Computer translation and communication packages, plotting routines, image manipulation and various utilities. See the SCC if you are interested in a particular package.

CHEMPS

The CHEMPS server is one of several LINUX servers being used in the Chemistry and Geological Sciences Departments. It is accessible by Windows, Mac and UNIX computers. Each member of the Chemistry Department may store files there, transfer files to others, and gain print access through CHEMPS. Remember there is a 100 MB limit for all accounts.

WWW Server

The department’s WWW server is a LINUX computer, CASEY. The server is used mostly for research group pages and general computing information. Students may add their own pages to the server to describe their current research. E-mail the SCC for an account and/or a web directory.

IP Addresses

Any new computers, printers, or equipment needing an IP address should be registered with the SCC. Send the type of equipment, the serial number or service tag of the equipment, the room in which it will be located, your account name on a Windows computer, your Auth ID, the operating system and the owner of the equipment in an e-mail. The SCC will set you up with an account on CHEMPS if you do not already have one. The network name and IP address will be sent to the DCC, Carol DeFeciani.

Names for computers will start with two letters indicating the building in which they are located: "gc" for GeoChem and "mm" for MacMillan. The initials that indicate the computer's building location are then followed by the room number in which the equipment is located, followed next by a hyphen and finally a unique identifier (often the owner's last name).

Printers' names start with the two letters indicating the building, followed by ".", then two letters indicating the type of printer and then three numbers indicating the room in which it is located. For example, the departmental printer in GC 257 is named gc-hp257.
**Important IP Addresses:**
The gateway for computers on the 2nd floor of GeoChem is 128.148.171.1
The gateway for computers on the 3rd and 4th floors in GeoChem is 128.148.68.1
The gateway for computers in MacMillan is 128.148.119.1
The campus nameservers are 128.148.128.130, 128.148.128.11, and 128.148.128.9
The netmask is 255.255.255.0

The CHEMISTRY workgroup server is chemps.chem.brown.edu at 128.148.68.50
The department webserver is casey.brown.edu at 128.148.136.10

**What Everyone Should Know About Using a Computer on the Brown University Chemistry Department Network:**

DO store your files in a folder that has your name or account name on it when using Windows and Mac computers.

DO NOT share accounts on the CHEMPS server or on any computer.

DO NOT install any games, chat, music sharing, instant messaging or remote access software on any department-owned computer – this includes computers belonging to research groups.

DO NOT install any software for which you do not have a sales receipt unless it is freeware and will help in your research and never install it on a research computer unless you have your advisor's consent.

DO NOT copy software from one computer to another.

DO NOT install software on the computer cluster. Notify margaret_doll@brown.edu to add the needed software.

DO NOT browse through, alter or destroy someone else files. Misuse of any computer at the University may lead to revocation of your right to use any Brown owned computer equipment.

To set up your Brown network account after you have your identification card. Go to the CIS building, on the corner of Waterman and Brook. The Help Desk at the entrance of that building will setup your password and e-mail account.

Contact margaret_doll@brown.edu for accounts on the CHEMPS server, the web server or the computer cluster; contact russ_hopson@brown.edu for computer accounts on the NMR computers. Use of any UNIX computers is restricted to research needs.

ALWAYS BACKUP! If you have data, documents, programs, or other files that you value stored on the hard disk of a computer, you should have an up-to-date backup copy of these files stored in another room, or better yet, another building. Nearly every type of computer in the department has suffered some hard disk problem over the past few years that destroyed some or all of the files stored on the machine’s disk. For users with backup, this sort of an event is an inconvenience; for those without backup, it can be a disaster. Students have lost files containing
crucial work for their dissertations. Talk to members of your research group or consult with either Computer Coordinator, carol_defeciani@brown.edu or margaret_doll@brown.edu, about how to perform backups of your files. Only some of the research Macs and Windows computers are backed up through the Department. Ask your research advisor whether the computer you are using is on a backup and which files are being backed up. Maintaining your own copy of important files ensures the fastest restoration of data.

Aside from performing backups, there are some rules for protecting your data, the computer you are using, and the general computer community.

1. If you use any computer requiring a login procedure, be sure that your password cannot be easily guessed. Don’t use a dictionary word or proper name for any language in your password. The password must be at least eight characters long and contain upper and lower case and non-alphabetic characters.
2. Do not share your computer account. The Computer Coordinator will be glad to create necessary accounts.
3. If you are a new user of some type of computer, consult with an experienced user for important information about operating that machine. Do not shutdown UNIX computers. Please see the NMR Facility Supervisor, Russ Hopson, on the NMR computers or Margaret Doll for any of the other UNIX computers.
4. Do not put food or other chemicals in a position where they could spill on the computer. We have lost several keyboards due to spills. Food and drinks are not allowed in labs and should not be near the computer equipment.
5. Clean out your files regularly. Disk space is a valuable resource and is not unlimited. Delete files you are no longer using. The Computer Coordinator may from time to time delete files on the department-owned Windows and Mac public computers, as well as ask various heavy users of disk space on the UNIX computers to clean out their files.
6. Pornography is not allowed on the computers.
7. Stolen software may not be installed.

Suspected misuse of computers will be investigated. The Computer Coordinators, Carol DeFeciani and Margaret Doll, reserve the right to review and remove any file or program, which appears to be inappropriate for a computer owned by the department. Violation of rules 2, 6 and/or 7 may lead to revocation of your computer privileges.

Where to Get Help

Help with computers is available from many sources. Fellow students and faculty who use the same machines and programs you do can sometimes offer advice or suggestions. Computer Coordinators will supply technical assistance to departmentally owned computers ONLY. The DCC, Carol DeFeciani, is the main troubleshooting resource for Windows and Macs; the SCC, Margaret Doll, is the main troubleshooting resource for UNIX and network consultations. The University provides the CIS Help Desk as a resource for students' personal computers. The Help Desk can be reached at 3-7457 (3-HELP).

Additional Documentation:

http://www.chem.brown.edu/computing
The Chemistry Stockroom

Inventory
Located in GC 216, the stockroom maintains an inventory of about 800 items, including chemicals, glassware and general supplies for teaching and research. Most general supplies are located on open shelves and are designated by labels located on the border of the shelf. Each section of the stockroom has an alphabetical designation and each bank of shelves is numbered within each section. The Chemistry Stockroom Catalog lists each item by a numerical designation. The first two digits correspond to the product category and the last three digits represent the item. Also listed in the catalog are the description, location and price of each item.

An example is:

<table>
<thead>
<tr>
<th>Catalogue #</th>
<th>Description</th>
<th>Location</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>04-003</td>
<td>Acetone, 4L</td>
<td>234D</td>
<td>$10.90</td>
</tr>
</tbody>
</table>

The appendix of this handbook includes copies of many forms, including a stockroom requisition form, used if the Stockroom Ordering System is down. If there are items that you will need on a regular basis that we do not stock, please see Mgr, Technical Services about having items added to the inventory.

Requisitioning Stockroom Supplies
The chemistry stockroom is presently operated on a self-serve basis. After finding what you need off the shelves, you must enter the information into the stockroom computer for Check Out. This Apple IMac computer is located on the left-hand side of the check out table in the stockroom. Please make sure you select your name from the drop down menu, select “Stockroom Purchase” and make sure to fill in the correct item number and quantity for each line item purchased.

Chemical Tracking
All chemical purchases must be transferred within the Chemical Environmental Management System (CEMS)/(Barcode Tracking System) to the new room location and PI/Advisor where they will be stored. This system is located on the Dell Computer on the right hand side of the check out table. Directions are posted above the computer. There is a user guide, tutorial and FAQ on the website. Please take time to familiarize yourself with this system. **You must be sure to update the barcode’s location and owner** fields when checking out chemicals from the stockroom. Finally, when chemicals are finished each group is responsible for updating the barcode # within the CEMS system to indicate that the item is now empty. **It is the responsibility of each lab to maintain the integrity of their data in this system.** Therefore it is highly recommended that a regularly scheduled reconciliation of these barcodes is performed to ensure this data is accurate and up-to-date. This system was developed by the University of New Hampshire and is maintained in an on-going collaboration between UNH and Brown University.
The checkout procedures are straightforward and directions are posted near the computers. If you need assistance, ask any stockroom personnel for help. Copies of the Chemistry Department Stockroom Order Form, and the Update Chemical Inventory Page from the CEMS site are in Appendix V.

**Blanket Order/Preferred Vendor Requisitions**

Many of your research supply needs can be found in the chemistry stockroom. Items not available in the stockroom can be purchased by using departmental blanket orders. These orders are initiated annually with about 20 different vendors for various types of products and services i.e., gas cylinders, sample analysis, electronics, specialty chemicals and glassware. A list of our present Chemistry Department Blanket Order/Preferred Vendors and their services is located in the appendices. If your research group will be doing on-going business with a vendor, for example sample analysis, please see Mgr, Technical Services or Stockroom Purchasing Assistant to set up a specific Blanket Purchase Order for your group with that vendor.

Items can be obtained from Blanket/Preferred order vendors by going to the Chemistry Stockroom link found under the helpful links section on the right side of this webpage:

http://www.chem.brown.edu/

Click on the “Chemistry Stockroom,” then “Online Ordering Form ” link to get to the form.

The information you will need includes:

1. Vendor name
2. Product description
3. Quantity required
4. Size
5. Catalog number
6. Advisors name

These items are ordered from our vendors on a daily basis. Most Blanket/Preferred vendor order items are received within two to five days, if the items are in stock. You will receive a notice of receipt in your mailbox or e-mail/voicemail when the item you ordered is received in the stockroom. Sometimes items are on back-order and can take up to several months to receive in some cases. You will be notified of back-order status and asked whether you want to proceed with the order or if you want to try and order the item from another vendor. Please keep a record of your order and if it appears to be taking too long to receive, contact any of the stockroom personnel to help you track it down. **Finally, this CEMS System has a complete list of all MSDS sheets** for the entire chemical inventory within Geo-Chem and MacMillan Hall. Please make sure to familiarize yourself with this feature so you know the hazards of the chemicals you work with.
Purchase Orders
Special items and all equipment purchases over $3,000.00 must be purchased through the University Purchasing Department using a Brown University Purchase Requisition form. (See appendix for sample).

You can access the PO form (in fillable PDF format) from the stockroom area of the Chemistry web page:  http://www.chem.brown.edu/facilities/stockroom.html

Once this form is filled out, you can either e-mail it to the stockroom staff as an attachment, or deliver it by hand to the Stockroom Purchasing Assistant. These requisitions are either entered into Brown’s on-line Purchasing System or ordered with credit card by stockroom personnel and must be authorized by the Mgr, Technical Services or another authorized person within the department such as the Department Manager. As the requisitioning party you are required to supply correct order information. This includes complete vendor name and address, phone, fax and web address, current product information, catalog number, and pricing, as well as the proper grant account number paying for the purchase. All orders must be approved by your research advisor prior to placing and must have proper justification for being charged to your grant account #. It is your responsibility to get this approval from your advisor. Be sure you meet all the vendors' minimum order requirements.

Internal Purchase Requisition (IPR)
This form is used to make purchases from Brown campus services, such as Graphic Services, Food Services, Metcalf Copy Center, Brown Bookstore and Brown Computer Store, etc. These forms can be obtained from Stockroom Purchasing Assistant and need to be signed by the Mgr, Technical Services or the Department Coordinator or Manager. A copy should be kept for your records and the secondary copy should be returned to the front office for filing purposes. The original is sent to the Brown Office Building by the supplying organization for billing purposes.

Office Supplies
Daily office supply needs are located in GC 216A at the entrance to the stockroom. These items need to be checked out on the stockroom IMAC computer for tracking purposes. In addition, if there is any office item not found in the Stockroom, you may place orders through the Blanket/Preferred System with vendor: Office Max. Copies of the Office Max catalog can be found in the Stockroom as well as in each of the administrative assistants offices. Please refrain from taking the entire supply of an office item. These supplies are intended to support everyone in the department. If you need a large quantity of an item, for example 50 blank CD ROMs, please place your own order with Office Max on our Blanket/Preferred ordering system.

Liquid Nitrogen
Liquid nitrogen can be dispensed by the liter from an LS-220 Dewar located in the stockroom. Please use the insulated gloves located at the tank and your own eye protection. Exercise caution while dispensing. Also use a Dewar to contain and transport liquid nitrogen. These transactions should also be logged (item # 13-075) into the stockroom IMAC computer for tracking purposes. If you have any questions about this process please see any of the Stockroom personnel or a seasoned graduate researcher for assistance.
Dry Ice
Dry ice is kept in a storage cooler in GC 121 (Loading/Receiving Dock). There is a crusher located adjacent to the bin. A key is available from each lab or the stockroom to access the bin. Check with your PI for the location of this key. **Please be sure to use caution when using the ice crusher** and fill out the white stockroom checkout form for tracking purposes. The item # for dry ice is **13-099**. Be sure to fill out the form completely to ensure accurate billing to research groups.

Cubed Ice
Ice machines are located in the south corridors of the third and fourth floors. This is free for research purposes. **This ice is not intended for human consumption.**

Compressed Gas
Gas cylinders can be purchased, as needed using the on-line Blanket/Preferred Ordering System to vendor: Corp Brothers. A list of the available gases can be found in the stockroom. Please see Stockroom Purchasing Assistant for a list. Cylinders ordered, if not specialty gases, will be received the following day. When received, the cylinders are stored in GC 121A (combustible gases) and 121B (inert gases). Your "DA" key will allow you access to those rooms.

Each cylinder has two cards on it. Remove the top card and give it to the Stockroom Coordinator when you pick up the cylinder. There are several hand trucks in the receiving dock area for transporting the cylinders. Be sure to use the chain on the hand truck to firmly secure the cylinder before transporting it. When the cylinder is empty it must be stored in GC 121C (Empty Cylinders) for removal by the vendor and the remaining card given to the Stockroom Coordinator.

OSHA regulations require that all cylinders be firmly secured while in use and in storage. Please use a cylinder harness in the lab and refasten the chain around those in storage when removing your cylinder from the full cylinder room. If you need further assistance with specialty cylinders or specific set ups, feel free to contact our Corp Brothers Sales Representative, John Hindle at (401) 331-8020 or cell (508)-509-9023. In addition the stockroom staff can help answer questions.

**Finally, please be aware that each cylinder ordered is paying a monthly rental fee,** so if you have cylinders that are empty, or not being used that are inexpensive gases, it makes sense to return these cylinders to avoid wasting money on the monthly rental charges.

Bulk Solvents
GC 217 located across from the elevator near the stockroom entrance is for the storage of bulk solvents and specialty fluids. In addition, 95% and 100% ethanol are also issued from this room. The inventory numbers are listed on each barrel as well as on the chalkboard near the stockroom check out table. If you are getting one of these bulk chemicals for the first time, the container must be bar-coded and added to the inventory system on the CEMS System via the Dell computer. If you are re-filling an existing container that is already bar-coded, then you only need to check out the quantity on the stockroom IMAC computer.
Please exercise extreme caution in this area. The introduction of any source of ignition could be extremely dangerous due to the flammability of the vapors produced by these solvents. Grounding wires are attached to electrically ground the drums and should be attached to the metal vessels when dispensing. The room is equipped with a Halon Suppression system in the case of fire. Please see any stockroom personnel if you are filling from this room for the first time to show you the proper procedure.

**Resources**
The Chemistry Stockroom has numerous catalogs and brochures of vendors and suppliers, and the stockroom personnel have a wealth of knowledge of where specific items can be procured. Always feel free to ask them for assistance if you are having difficulty finding something you need for your research. Various members of the faculty and staff also keep files of catalogs of equipment and chemicals of particular importance to their work. Finally, most of the major chemical vendors such as VWR, Fisher Scientific, Sigma Aldrich, etc. have extensive web sites that will help you in locating products and services you need. Always remember to shop your item across multiple vendors to make sure you are getting the best price possible. Also, for any orders above $1000 you should ask your sales rep for a quote for to make sure they are giving you the best possible price. The more you save on each item, the further your research dollars will stretch.
APPENDIX 1

Job Requirements and Duties of Teaching Assistants and Student Mentors in Undergraduate Courses

As part of its mission, the Department of Chemistry at Brown University teaches a large number of undergraduate students in its teaching laboratories. The operation of the teaching laboratories requires the employment of teaching assistants to ensure the safe operation of the laboratory and supervise the proper disposal of all waste. This document clarifies the duties and the job requirements for two kinds of assistants, referred to as “teaching assistants” and “student mentors.”

Briefly, teaching assistants help the undergraduates learn the techniques and theories behind the experiments. They also carry primary responsibility for the safe and orderly operation of the laboratories, and for enforcing rules for waste disposal. The mentors assist students in carrying out the experiments by facilitating the understanding of the experiments and providing peer leadership in an active learning environment.

Specific duties and job qualifications of the teaching assistants and mentors are:

1. **Teaching Assistants (TA’s)**

Teaching assistants are graduate students who assist faculty in the teaching of a course. An integral part of the graduate school experience in Chemistry, teaching is a necessary requirement for attaining a PhD. Through service as a TA, graduate students acquire teaching skills, learn about teaching techniques, and obtain an in-depth understanding of all the issues surrounding the teaching of Chemistry in the undergraduate curriculum.

The primary roles of teaching assistants are:

- Teach chemistry and chemistry laboratory methods to undergraduate students.
- Aid students in conducting and understanding of laboratory experiments and in the understanding of the course material.
- Ensure the safe operation of the laboratory. Enforce the usage of all protection measures appropriate for safe laboratory practice, such as wearing safety glasses or gloves, and the use of the fume hoods.
- Enforce all applicable laws and rules relating to the proper treatment of the chemicals and the waste produced in the experiments.
- Provide guidance to the student mentors.

Activities related to these roles include:

- Proctor and grade course examinations and laboratory quizzes.
- Grade laboratory reports and maintain accurate record keeping of grades.
- Hold office hours to assist undergraduates with course lecture and laboratory material.
Attend training sessions for experiments and grading procedures.

Required job qualifications:

1. Teaching assistants in Chemistry must be regularly enrolled in the Chemistry Department PhD Program (or in some cases, the Masters Program). Teaching Assistants must have attained a Bachelors degree, or equivalent. The standards for the Bachelor’s degree shall be those deemed sufficient for admission into an advanced degree program at Brown University.

2. The aforementioned degree shall have been in chemistry, or, with the permission of the department chairman or the Chemistry Department’s Graduate Admissions Committee, in a related science such as engineering, physics, biochemistry, or biology.

3. Teaching Assistants must successfully complete the Laboratory Safety Training and the Hazardous Waste Training courses provided by the Office of Environmental Health and Safety, covering the key elements of the University's laboratory safety and hazardous waste disposal. These courses include issues related to chemical hazards, fire safety, elementary first aid, personal protective equipment, general guidelines for working with chemicals, and emergency procedures.

4. Teaching Assistants must satisfactorily complete the Red Cross first-aid course offered during orientation week.

5. All teaching assistants must be certified in English at an appropriate level.

2. Student Mentors

Undergraduate student mentors may assist faculty and graduate students in teaching a course. In exceptionally rare circumstances, student mentors may assist in a laboratory.

The duties of student mentors are as follows:

- Facilitate enrolled student understanding of course content.
- Encourage an interactive and stimulating learning environment.
- Facilitate communication among students, and between students and TA’s.
- Tutor students in the material relating to the laboratory or the lectures.
- Provide leadership to their peers.

Required job qualifications:

1. Successful completion of the relevant chemistry course in a previous semester.

2. Satisfactory completion of the Laboratory Safety Training and the Hazardous Waste Training courses provided by the Office of Environmental Health and Safety, covering the key elements of the University's laboratory safety and hazardous waste disposal. These courses include issues related to chemical hazards, fire safety, elementary first aid, personal protective equipment, general guidelines for working with chemicals, and emergency procedures.
Department of Chemistry Teaching Evaluation Form

Chemistry Course #:___ __________Instructor:__________________________________________

Title:_________________Semester: spring / fall (circle one) Expected Course Grade: ___

Your Status: Freshman / Sophomore / Junior / Senior / Graduate (circle one) Concentration:

Please evaluate the teaching abilities of the above-named instructor in this course by circling the appropriate number.

A.

<table>
<thead>
<tr>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
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<tr>
<td>1</td>
<td>2</td>
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</table>

Please rate the instructor’s:

1. Ability to present ideas clearly.
2. Organization.
4. Enthusiasm for the subject matter.
5. Ability to stimulate intellectual curiosity and independent thought.
6. Availability and openness to questions.
7. Awareness of students’ level of understanding.

B. Did you seek help from the instructor during class? a)(yes / no) b)out of class? (yes / no)
   If yes, how available was it? How useful was it?

C. What do you feel are the instructor’s positive attributes as a teacher?

D. What are your recommendations to this instructor for improving her/his presentation and teaching effectiveness?
APPENDIX II

GUIDELINES FOR THE PREPARATION OF THE RESEARCH PROJECT DEFENSE (RPD)

Written Report

The written report for the RPD should contain the following 5 sections:

1. Abstract
2. Background and Significance
3. Progress Report--Experimental Results and Analysis
4. Future Plans
5. Supporting Information

The total length of the report, excluding the supporting information, should not exceed 10 pages.

1. Abstract
Provide a one or two paragraph summary of the key findings and conclusions of the research described in the report.

2. Backgrounds and Significance
Briefly describe the background, significance, and justification for your project. This section should critically evaluate existing knowledge, and specifically identify the gaps in knowledge that your project is intended to fill. A minimum of three pages is required for this section.

3. Progress Report
This section should describe the research results you have obtained to date. Provide an organized summary of the experiments or sets or experiments you have carried out. Clearly identify what questions are being asked or what hypotheses are being tested. This section is NOT intended to simply be a compendium of everything you have done since joining your research group. Rather, it must be a cogent presentation of your research as well as the analytical processes employed in responding to unanticipated and undesired results as they arose. The committee is interested in learning about WHAT you did as well as WHY you did it.

Regardless of whether your results are ready for publication or not, you should write with the clarity and focus that is expected for a published manuscript. Experimental and spectroscopic details should only be provided in this section if they are pertinent to the discussion. In general, experimental details should be provided in the Supporting Information.

4. Future Plans
Provide a proposal for your research plan for the next two years. This should be broken down into individual specific aims, and each specific aim should be focused on a single hypothesis. Clearly articulate how the experiments that you propose to carry out will test the hypothesis. Discuss the potential difficulties and limitations of the proposed procedures and suggest alternative approaches to achieve the aims. Provide a timetable for achieving each specific aim.
5. Supporting Information
Experimental details for the experiments described in section 3 should be provided here. This section should use the guidelines from a top-tier journal in the field, which is appropriate for presenting the experimental results. Consult with your research advisor about the choice of standard, which is appropriate for your work, and clearly indicate this at the beginning of this section. Suggested journals included – J.Am.Chem.Soc / Science / PNAS / J.Org.Chem. / Langmuir / J.Phys.Chem / Biochemistry.

Format

The final proposal must be **double-spaced in 12-point font or larger, using 1” margins and no longer than 10 pages** including tables and figures, but excluding references. References must be presented with full citations including titles of articles and full list of authors.

Oral Report and Examination

You should prepare a 30-45 minute oral presentation of your research for the committee. While it is important for you to thoroughly understand the background of your research, the oral presentation is intended to focus on your own work and not extensively on the prior results in the field. Thus, the presentation should start with a very brief introduction to the problem at hand, but the bulk of the talk should present your own accomplishments and future research plans. It is very likely that the committee will interrupt frequently with questions, so the examinations should be scheduled for a two-hour time period. While your presentation should be semi-formal (i.e. overhead transparencies or laptop PowerPoint projection) you should also be prepared to go to the board to answer questions as they arise.
APPENDIX III

GUIDELINES FOR THE PREPARATION OF
THE ORIGINAL RESEARCH PROJECT (ORP)

The research proposal is an opportunity to define and present an original idea that is suitable for scientific investigation. In preparing the research proposal students must evaluate the feasibility and significance of a research problem. The quality of the proposal and its defense is used by the faculty as a measure of the progress of the student toward a doctorate in chemistry.

In order that students approach this experience in an unbiased way, the research proposal should be concerned with a chemistry topic that is not directly related to research in their group. If there are any doubts on the appropriateness of the topic, the student should consult their research supervisor or other faculty member for an opinion on the suitability of a particular idea. Specific assistance obtained from faculty or other sources, however, must be acknowledged in the proposal abstract.

ORP Deadlines: ORP abstracts should be submitted to the Thesis Committee and the Graduate Program Coordinator by the weekday closest to September 7th. Upon approval of the abstract, the student will prepare and submit a full proposal to the Thesis Committee and Graduate Program Coordinator. The student will schedule an ORP presentation and defense with her/his Thesis Committee. The full proposal must be submitted at least two weeks prior to the ORP defense. The ORP defense must be completed by December 10th.

There are three stages to this process: Proposal Abstract, Full Proposal, and Oral Defense.

Research Proposal Abstract

A project summary must be submitted to the Graduate Program Administrative Assistant and to members of the Thesis Committee.

The PhD committee will be made up of the student's research advisor plus two other faculty members that are in the area of research (see the list below). Students are responsible for requesting that individual faculty members serve on their committee and then notify the Graduate Program Administrative Assistant of the committee membership. A copy of the project summary should be provided to each faculty member that is on the PhD committee. The faculty will carry out a preliminary evaluation of the proposal on the basis of this summary statement.

The project summary must contain the following information:

1. A brief description of the significance of the project.
2. A clear and concise list of specific aims and objectives.
3. An overview of methods to be employed in order to achieve those specific aims.
4. A list of key references in ACS format. References should include the complete titles of all articles, and a complete list of authors.
The project summary must be single-spaced in 12-point font or larger, and it should be no longer than 2 pages, including tables and figures, but excluding references. A project summary that does not provide sufficient detail about the proposed experiments will be returned without review, as will summaries that exceed the page limit. The results of this review will be transmitted to the student by the research supervisor and by a letter from the Director of Graduate Studies.

**Full Proposal**

Once the project summary is approved, students should prepare the full proposal. The proposal should include sufficient information to permit evaluation without reviewers having to refer to the literature. Brevity as well as clarity is important indicators of the students' scientific communication skills. A successful proposal will answer the following questions: Why is the work important? What has already been done? What do you intend to do? How are you going to do the work?

The proposal should be a focused research proposal with a well-defined set of experiments, not an outline for a major multi-year, multi-person project. As a guideline, the proposal should encompass work that can be accomplished by a senior graduate student or post-doc in a year or two. While there are no formal restrictions on the scope of the proposal, a project that requires a full research group effort over several years is too ambitious due to the space and time constraints.

The proposal must be organized into the following three sections:

1. **Specific Aims.** State the specific purposes of the research proposal and the hypotheses to be tested. These must be clearly as well as concisely articulated, usually in no more than a few sentences per specific aim. Reasonable specific aims are not sweeping in scope, but neither do they dwell on the minutiae of the experiment.

2. **Background and Significance.** Sketch briefly the background to the proposal. State concisely the importance of the research described in the proposal by relating the specific aims to broad, long-term objectives and prior work in the field. While the space devoted to this section will vary, it is suggested that no more than 3 pages be devoted to the coverage of background and significance.

3. **Research Design and Methods.** Provide an outline of experiments and methodology that will be used to accomplish each specific aim. Potential experimental difficulties should be discussed together with alternative approaches that could achieve the desired aims.

**Format**

The final proposal must be double-spaced in 12-point font or larger, using 1” margins and no longer than 10 pages including tables and figures, but excluding references. References must be presented with full citations including titles of articles and full list of authors.
Submission

The final proposal should be submitted to your advisor and to the members of your PhD committee, which should be made up of two faculty members from the appropriate sub-fields. For Academic Year 2011-2012, the members of the sub-fields are:

- **Biochemistry**: Basu, Bazemore-Walker Cane, Delaney, Salomon, Sello, Seto, Suggs
- **Inorganic**: Bernskoetter, Kim, Sun, Sweigart
- **Organic**: Basu, Cane, Delaney, Seto, Suggs, Williard, Zimmt
- **Physical**: Baird, Diebold, Doll, Rose-Petruck, Stratt, Wang, Weber, Zimmt

**Oral Defense – Must be completed by the last day of classes of your fifth semester.**

When the final version of the research proposal has been submitted, a time and date for the presentation should be arranged in consultation with the members of your committee and in consultation with The Graduate Program Administrative Assistant to ensure that a room is available. **Allow at least 2 weeks between submission of the final version of the proposal and the date of the oral presentation.** Students should bring a copy of their proposal to the oral presentation. At the appointed time, students should present a brief (thirty minutes) description of their proposal and clarify any points that the examining committee may raise. Be prepared to discuss, at the oral defense, the resources, personnel, and time required for carrying out the experiments that are proposed.

In case a research proposition is found to be sub-standard, the student may be requested to write a paper or present a seminar in which the points raised during the oral presentation are explicitly addressed. In case of an unsatisfactory defense, an oral presentation of a second research proposition (on a different topic) may be requested, or in extreme cases the student may be asked to withdraw from the PhD program.

Following successful completion of the oral defense, a copy of the approved proposal, initialed by the members of the committee, must be given to the Graduate Program Administrative Assistant. **In all cases, the oral defense must be completed satisfactorily by the end of the fifth semester in order for the department to certify that the student has successfully completed the preliminary requirements for the PhD.** The department does not guarantee financial support to any student that fails to satisfy the preliminary requirements within the required time.
APPENDIX IV
Standards of Student Conduct

http://www.brown.edu/Student_Services/Office_of_Student_Life/judicial_affairs/randr/conduct_standards.html

Policies

All members of the Brown University Community are entitled to the following rights: the rights of peaceful assembly, free exchange of ideas and orderly protest, and the right to attend, make use of or enjoy the facilities and functions of the University subject to prescribed rules. All members of the Brown University community are also entitled to live in an environment free from harassment on the basis of such characteristics as race, religion, gender, disability, age, economic status, ethnicity, national origin, sexual orientation, gender identity, or gender expression. (See also "Principles of the Brown University Community")

Comment

These rights may from time to time come into conflict, and it might be difficult to draw a clear and precise line between the reasonable exercise of and the abuse of such rights. The circumstances in each case will vary, but the objective must always be to assure a fair and reasonable balance whenever there is a conflict among the rights mentioned above.

1. Occasionally, the rules of the University and the law will overlap, but the University does not attempt to duplicate the law. The University reserves the right to pursue matters through its non-academic disciplinary procedures that may also be addressed in the legal system.
2. Serious or persistent minor violations of University rules or regulations may result in suspension or expulsion.
3. In their off-campus lives students are also expected to conform to the standards of community behavior as expressed in the Principles of the Brown University Community and in these Standards of Student Conduct.

Offenses

I. Behavior that disrupts or materially interferes with the basic rights of others and the educational functions of the University.

Comment: Protests or demonstrations that infringe upon the rights of others to peaceful assembly, orderly protest, the free exchange of ideas, or that interfere with the rights of others to make use of or enjoy the facilities or attend the functions of the University
cannot be tolerated. [See "University Guidelines on Protests and Demonstrations"]

II. Actions that:

1. Result in or can be reasonably expected to result in physical harm to a person or persons.

2. Are unreasonably disruptive of the University community and/or its neighborhoods.

3. Result in or can be reasonably expected to result in damage to property.

Comment: Offense II encompasses a wide range of behavior, including, but not limited to assault, vandalism, throwing, hurling or firing projectiles without regard for persons or property.

III. Sexual Misconduct: non-consensual physical contact of a sexual nature.

Comment: Offense III encompasses a broad range of behaviors, including acts using force, threat, intimidation, or advantage gained by the offended student's mental or physical incapacity or impairment of which the offending student was aware or should have been aware. Harassment, without physical contact, will not be deemed sexual misconduct under these provisions.

IV. Subjecting another person or group to abusive, threatening, intimidating, or harassing actions, including, but not limited to, those based on race, religion, gender, disability, age, economic status, ethnicity, national origin, sexual orientation, gender identity, or gender expression. (See "Civil Rights & Non-Discrimination")

V. Drugs and/or Alcohol:

1. Illegal possession or use of drugs and/or alcohol and/or drug paraphernalia.

2. The illegal provision, sale, or possession with intent to sell/provide drugs and/or alcohol and/or drug paraphernalia.

Comment: The use of any drug, including alcohol, related to any offense will be considered an aggravating circumstance independently of whether the drug was used legally or illegally by the offending party. This factor in a case may result in a more severe sanction and/or the imposition of terms requiring evaluation or treatment, as determined by appropriate professionals. (See Brown Policy on Drugs.) All students who are party to a disciplinary matter involving alcohol and who, in the determination of a dean, misused alcohol or exercised poor judgment due to alcohol or about alcohol, will be required to
undergo appropriate alcohol education, evaluation, and/or treatment as determined by appropriate officials.

Drug paraphernalia includes, but is not limited to, all items used for the purpose of preparing, injecting, ingesting, inhaling or otherwise using illegal drugs, or in the illicit use of legal drugs.

Providence municipal ordinances prohibit the possession of open containers of alcoholic beverages on public ways. Providence Police and, in the case of violations on the streets immediately adjacent to the campus, the Brown University Department of Public Safety, enforce these ordinances. Violations of the open container policy on University property are enforced by the Department of Public Safety and through the University non-academic disciplinary procedures.

VI. Theft or attempted theft of property and/or possession of stolen property.

VII. Failing to comply with the proper directive(s) of a University official, including refusing to identify oneself or refusing to present University identification to a University staff member, including members of the Department of Public Safety.

Comment: A University community depends upon the cooperation of all of its members to assure reasonable safety and security. There are many occasions, including emergencies, and cases of suspected unlawful conduct, when it is especially important that authorized personnel are able to identify members of the Brown University community.

VIII. Possession, use, or distribution of firearms, ammunition, explosives, or other weapons.

Comment: The University defines firearms as any projectile firing device, including conventional firearms (devices using gunpowder), all types of air rifles, guns using BBs, pellets, or darts, or any slingshot device. All fireworks are prohibited. Knives are prohibited, except those that are designed and used for food preparation.

IX. Violation of operational rules governing various offices, departments and facilities of the University (e.g., Residential Life, Student Activities Office, Dining Services, Computing and Information Services, the Libraries, etc.).

X. Misrepresentation:
1. Lying or materially misrepresenting information to an official University body or officer, including a member of the Department of Public Safety.

2. Lying in the course of a non-academic disciplinary hearing constitutes an offense that is immediately actionable.

Comment: Offense X.1. includes the fraudulent use of University identification cards. Lying or misrepresentation that inhibits or interferes with an official University investigation or hearing will be considered a serious offense.

University procedures allow a student involved in a disciplinary matter to remain silent.

XI. Violation of the terms of any non-academic disciplinary sanction.

XII. Failing to appear as a witness during a non-academic disciplinary hearing.

Comment: The Principles of the Brown University Community state that all members of the University community are responsible for supporting and maintaining a scholarly community in which all share together in the common enterprise of learning. This responsibility includes participating in established University processes.

The comments contained herein are offered as a guide to understanding the University's policies, and are not to be confused with the policies themselves. As such these comments are not binding upon the University or its designated representatives.
APPENDIX V

Chemistry Department Blanket Order Form

<table>
<thead>
<tr>
<th>Order type:</th>
<th>Vendor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanket Order</td>
<td>No Selection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name:</th>
<th>Purpose:</th>
<th>Course:</th>
<th>Orderer Name if not same as above:</th>
<th>Orderer Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Selection</td>
<td>No Selection</td>
<td>No Selection</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Catalog Number</th>
<th>Description</th>
<th>Size</th>
<th>Est. Cost</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Special instructions:

For barcoding purposes, if you have ordered a chemical, please provide us the room number of the lab the chemical will be stored in (ie. GC 411):

Send order to Stockroom  Reset this form
## Brown Chemistry

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Service</th>
<th>Phone</th>
<th>Web Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ace Glass Inc.</td>
<td>Glassware</td>
<td>800-223-4524</td>
<td>* <a href="http://www.aceglass.com">www.aceglass.com</a></td>
</tr>
<tr>
<td>Aldrich(Sigma)</td>
<td>Chemicals</td>
<td>877-333-3454</td>
<td><a href="http://www.sigmaaldrich.com">www.sigmaaldrich.com</a></td>
</tr>
<tr>
<td>Chemical Co</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amersham Biosciences/</td>
<td>Gene Protein Cell Prods</td>
<td>800-526-3593</td>
<td><a href="http://www.amershambiosciences.com">www.amershambiosciences.com</a></td>
</tr>
<tr>
<td>GE Healthcare</td>
<td>Lipids</td>
<td>800-227-0651</td>
<td><a href="http://www.avantilipids.com">www.avantilipids.com</a></td>
</tr>
<tr>
<td>Avanti Polar Lipids</td>
<td>BiO-Rad Laboratories</td>
<td>800-424-6723</td>
<td><a href="http://www.bio-rad.com">www.bio-rad.com</a></td>
</tr>
<tr>
<td>Cambridge Isotope Labs</td>
<td>Deuterated Solvents</td>
<td>800-322-1174*</td>
<td><a href="http://www.isotope.com/cil/">www.isotope.com/cil/</a></td>
</tr>
<tr>
<td>Cambridge Valve &amp;</td>
<td>Brass Valves &amp; Fittings</td>
<td>401-738-1551*</td>
<td><a href="http://www.swagelok.com">www.swagelok.com</a></td>
</tr>
<tr>
<td>Fitting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem Glass</td>
<td>Glassware</td>
<td>800-843-1794</td>
<td><a href="http://www.chemglass.com">www.chemglass.com</a></td>
</tr>
<tr>
<td>Corp Brothers</td>
<td>Gas cylinders</td>
<td>401-331-8020*</td>
<td><a href="http://www.corpbrothers.com">www.corpbrothers.com</a></td>
</tr>
<tr>
<td>CVI Laser</td>
<td>Laser and Optics</td>
<td>800-296-9541*</td>
<td><a href="http://www.cvism.com">www.cvism.com</a></td>
</tr>
<tr>
<td>Doe &amp; Ingalls</td>
<td>Bulk Solvents/Chemicals</td>
<td>781-391-0909*</td>
<td><a href="http://www.doeingalls.com">www.doeingalls.com</a></td>
</tr>
<tr>
<td>Grainger Inc.</td>
<td>Equip.</td>
<td>401-467-9160</td>
<td><a href="http://www.grainger.com">www.grainger.com</a></td>
</tr>
<tr>
<td>Integrated DNA</td>
<td>Electronics/Mechanical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Cane Group</td>
<td>DNA Analysis</td>
<td>800-328-2661*</td>
<td><a href="http://www.idtna.com">www.idtna.com</a></td>
</tr>
<tr>
<td>Kurt Lesker</td>
<td>Vacuum Products</td>
<td>800-245-1656*</td>
<td><a href="http://www.lesker.com">www.lesker.com</a></td>
</tr>
<tr>
<td>McMaster-Carr</td>
<td>Mechanical</td>
<td>732-329-3200*</td>
<td><a href="http://www.mcmaster.com">www.mcmaster.com</a></td>
</tr>
<tr>
<td>MDC Vacuum</td>
<td>Vacuum Products</td>
<td>800-443-8817*</td>
<td><a href="http://www.mdcvacuum.com">www.mdcvacuum.com</a></td>
</tr>
<tr>
<td>MSC Industrial Supply</td>
<td>Mechanical</td>
<td>401-725-4340*</td>
<td><a href="http://www.mscdirect.com">www.mscdirect.com</a></td>
</tr>
<tr>
<td>New Egg</td>
<td>Computer Hardware</td>
<td>800-390-1119*</td>
<td><a href="http://www.newegg.com">www.newegg.com</a></td>
</tr>
<tr>
<td>Newark Electronics</td>
<td>Electronics</td>
<td>800-263-9275*</td>
<td><a href="http://www.newark.com">www.newark.com</a></td>
</tr>
<tr>
<td>Newport</td>
<td>Laser and Optics</td>
<td>800-222-6440*</td>
<td><a href="http://www.newport.com">www.newport.com</a></td>
</tr>
<tr>
<td>Office Max</td>
<td>Office Supplies</td>
<td>800-426-3033*</td>
<td><a href="http://www.officemaxsolutions.com">www.officemaxsolutions.com</a></td>
</tr>
<tr>
<td>Pharmco Products</td>
<td>Bulk Alcohol</td>
<td>800-243-5360*</td>
<td><a href="http://www.pharmco-prod.com">www.pharmco-prod.com</a></td>
</tr>
<tr>
<td>Pierce</td>
<td>Protein and Chemicals</td>
<td>800-874-3723*</td>
<td><a href="http://www.piercenet.com">www.piercenet.com</a></td>
</tr>
<tr>
<td>Scientific Grp/</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Wilmad Glass</td>
<td>Glassware</td>
<td>800-220-5171*</td>
<td><a href="http://www.wilmad-labglass.com">www.wilmad-labglass.com</a></td>
</tr>
<tr>
<td>Small Parts Inc.</td>
<td>Small Hardware/</td>
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</tr>
<tr>
<td>Stratagene</td>
<td>DNA Analysis</td>
<td>305-557-8222*</td>
<td><a href="http://www.smallparts.com">www.smallparts.com</a></td>
</tr>
<tr>
<td>Stem Chemicals</td>
<td>Mechanical</td>
<td>800-424-5444*</td>
<td><a href="http://www.stratagene.com">www.stratagene.com</a></td>
</tr>
<tr>
<td>Thor Labs</td>
<td>Laser and Optics</td>
<td>973-579-7227*</td>
<td><a href="http://www.thorlabs.com">www.thorlabs.com</a></td>
</tr>
<tr>
<td>VWR Scientific</td>
<td>Lab Supplies/Chemicals/</td>
<td>800-932-5000</td>
<td><a href="http://www.vwrsp.com">www.vwrsp.com</a></td>
</tr>
<tr>
<td></td>
<td>Equip.</td>
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</tr>
</tbody>
</table>

**Fisher Scientific** is our Primary large vendor for chemicals and supplies. **VWR** is our secondary. They distribute for hundreds of suppliers. Please check both of their websites for item availability and pricing. [WWW.Fishersci.com](http://WWW.Fishersci.com) and [WWW.VWRSP.com](http://WWW.VWRSP.com)

Also, it is possible to set up individual On-line ordering accounts for streamlined 24/7 purchasing which will charge directly to your supporting account #. Please see the Stock Room Manager to set this up.
Chemistry Department Stockroom Order Form

Please complete ALL fields below:

Order Type: ☒ Stockroom Purchase Please check box

Name: Friedfeld, Eric
Non-Chemistry Users, please choose Non-Chemistry.

Purpose: ☐ Research ☒ Administrative ☐ Teaching
If purpose is teaching, please select course below.

Course: Chem 33

Proceed to Step 2

---

Chemistry Department Stockroom Order Form

All customers, complete following section:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Stock #</th>
<th>Description</th>
<th>Unit Price</th>
<th>Item Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>1</td>
<td>12-123</td>
<td>RULER WOOD, 12 IN</td>
<td>$0.50</td>
<td>$0.50</td>
</tr>
<tr>
<td>Item 2</td>
<td>3</td>
<td>09-080</td>
<td>SHARPS COLLECTOR</td>
<td>$5.20</td>
<td>$15.60</td>
</tr>
<tr>
<td>Item 3</td>
<td>2</td>
<td>03-129</td>
<td>PIPET TIPS, RT200,</td>
<td>$3.37</td>
<td>$6.74</td>
</tr>
<tr>
<td>Item 4</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Item 5</td>
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</tr>
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</table>

Order Total: $22.84

Back to previous screen Proceed to Step 3
Chemistry Department Stockroom Order Form

Non-Chemistry Department Users complete this section:

Department: Engineering  Advisor/PI Name: Mathiowitz
Phone: 3-1234
Orderer Name: John Smith
Account #: 5-12324 (This field is required!!)

Please type account number in this format: 1-12345 (include dash)

---

Chemistry Department Stockroom Order Form

Thank you for placing an order. Remember, if you have purchased chemicals, you need to use the Dell computer to reassign the barcode to your lab. Ask a stockroom assistant for help with this process.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Stock #</th>
<th>Description</th>
<th>Unit Price</th>
<th>Item Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>1</td>
<td>12-123</td>
<td>RULER WOOD, 12 IN</td>
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<tr>
<td>Item 2</td>
<td>3</td>
<td>09-080</td>
<td>SHARPS COLLECTOR</td>
<td>$5.20</td>
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</tr>
<tr>
<td>Item 3</td>
<td>2</td>
<td>03-129</td>
<td>PIPET TIPS, RT200,</td>
<td>$3.37</td>
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</tr>
<tr>
<td>Item 4</td>
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<tr>
<td>Item 5</td>
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</table>

Order Total: $22.84

Please click here when done.
### Chemistry Stockroom

**PLEASE PRINT CLEARLY**

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CATALOG #</th>
<th>DESCRIPTION</th>
<th>UNIT COST</th>
<th>TOTAL COST</th>
<th>DATE</th>
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<tbody>
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</tr>
</tbody>
</table>

**Outside Department Only**

Dept. 

Account #

or IPR #

Phone #

### Hazardous Waste

Contents: (Full chemical names only, no abbreviations or chemical formulas)

1. 

2. 

3. 

4. 

5. 

Investigator/Generator: 

Environmental Health and Safety Use Only.
Update Chemical Inventory

What does this do?
The Update Inventory module allows you to enact one or more actions on a list of barcodes. The following actions are supported: update owner, update location, reinventory room, mark all surplus, mark all in-transition, mark all hidden, update evaluation date, update refill date, mark all empty.

Step 1: enter barcodes for inventory you would like to update
Enter one or more barcodes each separated by a newline, comma, or space. If you are using a portable barcode scanner, dump the contents of the scanner into a text file and copy the contents into this field. Click next to proceed. Note: There is a maximum input limit of 10000 barcodes. If you need to do more, divide the barcodes you need to update in sets of 10000.
### Update Chemical Inventory

**Step 2: review list for accuracy**

The following list of containers matches the list of barcodes you entered from the previous screen. Review this list for accuracy then select one or more options below. Click submit to make your changes final. Note: CEMS does not allow users to update containers unless the user has owner access to the container, or the user has administrative privileges. CEMS will display these containers at the bottom of the list highlighted in red.

<table>
<thead>
<tr>
<th>barcode</th>
<th>chemical</th>
<th>owner</th>
<th>location</th>
</tr>
</thead>
<tbody>
<tr>
<td>72456</td>
<td>hexanes</td>
<td>Cane, David</td>
<td>GC GC403</td>
</tr>
</tbody>
</table>

**Step 3: specify actions**

Select one or more options below. The options selected will be enacted for all containers listed in Step 2.

- Update Owner
- Update Location room reinventory
- Mark All As Surplus
- Mark All In-Transition
- Mark All Hidden
- Update Evaluation Date
- Update Refill Date
- Mark All Empty
<table>
<thead>
<tr>
<th>Account No. 1</th>
<th>%</th>
<th>Account No. 2</th>
<th>%</th>
<th>Account No. 3</th>
<th>%</th>
<th>Account No. 4</th>
<th>%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Quantity</th>
<th>Unit</th>
<th>Description</th>
<th>Unit Price</th>
<th>Details</th>
</tr>
</thead>
</table>

FUND APPROVAL | RESEARCH APPROVAL | SAFETY APPROVAL FOR HAZARDOUS MATERIAL | TOTAL |

Originator's Signature: ____________________________

Authorized Signature: ____________________________