Graduate Program Handbook

2003/2004

Department of Chemistry

Boston University

Life Sciences and Engineering Building
To be Completed in 2005
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Welcome to the graduate program in the Department of Chemistry at Boston University. The years ahead, in which you strive to become qualified research scientists and teachers, will be both challenging and rewarding. To make your graduate experience successful, it is important that you understand that both the University and the Department have procedures that you must follow and requirements you must meet to achieve your academic goals. We have developed the Graduate Program Handbook to serve as a reference that will help you appreciate and meet those requirements, with information about:

• What and whom you need to know to get started
• Faculty expectations of you as graduate students and as developing scientists
• Academic requirements for course work, qualifying examinations, research, and dissertation
• Deadlines for completing requirements
• Information about financial assistance, and
• Responsibilities as Teaching Fellows

The Handbook is a shared resource among the Department’s students, faculty, and staff. Its guidelines and procedures will ensure that we are all “playing by the same rules.” All of us – students, staff, and faculty – should turn to it as the first step when seeking to clarify procedures and requirements.

Orientation

The Department holds mandatory orientation for new students for the week preceding their registration for classes in either September or January. During this period they:

• Meet fellow students, faculty, and staff
• Find out about the Department laboratories and facilities
• Are assigned faculty advisors and register for courses
• Learn about responsibilities and duties of Teaching Fellows
• Begin safety training
• Attend English language tutorials given by CELOP (Center for English Language Orientation Programs) – required of most Teaching Fellows for whom English is not the primary language.

Department overview

The Department of Chemistry is located in the Metcalf Center of Science and Engineering (SCI) at 590 Commonwealth Avenue. In the summer of 2005, we will be expanding into the new Boston University Life Sciences and Engineering Building (LSE) currently under construction on Cummington Street (see artist’s rendition on cover). Our web site address is www.bu.edu/chemistry.

The Chairman of the Department is Tom Tullius [SCI 299] and the Associate Chair is Standish Hartman [SCI 273]. We have 24 tenure-track faculty, six lecturer/course coordinators, and three postdoctoral faculty fellows. Each year between 20 and 25 new graduate students enter our program. At any one time, there are approximately 115 graduate students in the Department, many of whom are Teaching Fellows.
Important faculty and staff contacts

Academic Administrator Your first contact in the Department will be with Kevin Burgoyne, the Academic Administrator [SCI 299]. He administers the details of admissions, registration, records, reports, courses, and study programs. He is your interface with the BU Graduate School administration and should be the first person consulted on all administrative questions not answered by this Handbook.

The Director of Graduate Studies (DGS) and the Graduate Affairs Committee (GAC) The DGS and GAC address matters about graduate affairs in the Department. The current DGS is the Associate Chair for Graduate Affairs, John Straub [SCI 503]. Departmental policies and procedures (including those relating to exams, curricula, petitions, and admissions) are administered through the GAC. Questions about interpretation of rules go through the DGS, which will field non-routine questions about Departmental and Graduate School (GRS) academic policy.

The GAC is chaired by Amy Mullin [SCI 518], who is the Associate Chair for Graduate Admissions. Kevin Burgoyne is the staff contact with the GAC. The faculty members of these committees are:

<table>
<thead>
<tr>
<th>Committee</th>
<th>Chair</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Affairs</td>
<td>John Straub</td>
<td>John Caradonna, David Coker, Rosina Georgiadis, Scott Schaus</td>
</tr>
<tr>
<td>Graduate Admissions</td>
<td>Amy Mullin</td>
<td>Sean Elliott, Tom Keyes, Richard Laursen, Mark Grinstaff, John Porco, Scott Schaus</td>
</tr>
</tbody>
</table>

Student representation on the GAC In addition, there are two graduate students representatives on the GAC. One of them is selected by the DGS. The other is the current President of the BUYCC (Boston University Young Chemists Committee – see http://people.bu.edu/buycc/). These students serve on the GAC to provide student perspectives on important issues being deliberated by the Committee. They are expected to meet with their fellow students and bring requests and concerns to the attention of the GAC for consideration.

Faculty advisor Each beginning graduate student is assigned a temporary faculty advisor (usually a member of the GAC) who serves until the student selects a Research Advisor. The Research Advisor acts as your counselor and research mentor. Your advisor is the faculty member who will become the most familiar with you and your situation and is the first person you should contact for routine academic advice.

Department staff As a graduate student, you will be working with many of the Department’s staff at different times. The various Department functions and the people who perform them are as follows:

<table>
<thead>
<tr>
<th>Course Coordinators</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>General chemistry (CH101, 102)</td>
<td>Alex Golger [SCI 272B]</td>
</tr>
<tr>
<td>Organic chemistry (CH203, 204, 210, 211, 212, 214, 281, 282)</td>
<td>Georgia Weinstein [SCI 358B]</td>
</tr>
<tr>
<td>Environmental, life science, and biochemistry courses (CH161, 171, 172, 421)</td>
<td>Robert Umans [SCI 358A]</td>
</tr>
<tr>
<td>General and analytical chemistry (CH131)</td>
<td>Bruno Rubio [SCI 452B]</td>
</tr>
<tr>
<td>General and analytical chemistry (CH108, 110, 111, 112, 181, 182, 201)</td>
<td>Alan Crosby [SCI 344]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Administration</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Manager. Handles the Department’s financial affairs and is the person you should see if you have payroll questions.</td>
<td>Charles Alongi [SCI 299]</td>
</tr>
<tr>
<td>Administrative Coordinator, assistant to the Chairman, who can help you with items related to physical facilities (e.g., keys, projectors, photocopiers).</td>
<td>Elaine Early [SCI 299]</td>
</tr>
<tr>
<td>Grants Administrator can assist you with petty cash and miscellaneous reimbursements, as well as answer questions about research grant-related transactions.</td>
<td>Mike Gooley [SCI 299]</td>
</tr>
<tr>
<td>Purchasing Assistant handles routine purchases of research supplies and is the first contact when problems arise with orders.</td>
<td>Alicia Downey [SCI 299]</td>
</tr>
<tr>
<td>Accounts Payable Coordinator handles matters related to purchasing and reimbursement payments.</td>
<td>Nathan Garrison [SCI 283]</td>
</tr>
<tr>
<td>Grants Development Administrator can help you identify and develop fellowship opportunities</td>
<td>Katinka Csigi [SCI 453]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Computers</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Computer Resources. Responsible for the Department’s computer hardware and software. Runs training sessions on the computer system for new students and will be available to help with specific computer problems.</td>
<td>Milton Masud [SCI 299]</td>
</tr>
</tbody>
</table>
**Instrumentation - Laboratory Technicians**

- **Instrumentation Manager.** Michael Creech [SCI B74A]
  Maintains the major instrumentation in the Department used for research and training.
- **Electronics Technician** to assist the Instrumentation Manager. Serge Zdanovich [SCI B74]
- **Senior Lab Technician in the third floor teaching labs.** Han-Li Sun [SCI 346/348]
- **Senior Lab Technician in the general chemistry stockroom.** Boris Bezverkhny [SCI 262]

**Libraries**

- **Science Librarian** will help you to find materials or to do literature searches. The Science Library is part of the BU Mugar Library system. Ardelle Legg [38 Cummington Street]

**Boston University Graduate School personnel**

The Department of Chemistry is administratively a part of two schools of Boston University: the College of Arts and Sciences (CAS), which is the undergraduate branch, and the Graduate School (GRS). (See: http://www.bu.edu/cas/.) The two schools are closely connected academically and administratively through the Provost, Dennis D. Berkey. The chief academic officer of the Graduate School is Associate Dean Scott Whitaker.

In practice, if you have questions or concerns, you should first contact the appropriate Department of Chemistry staff. In some situations, they may recommend that you consult directly with a member of the GRS staff.

**Logging in**

**Keys** During orientation you will be issued keys to your mailbox, your office and/or lab, and a “004” passkey by Elaine Early, the Administrative Coordinator. The 004 key opens the Graduate Lounge (SCI 280), SCI 299A (where the photocopier and laser printers are located), and the computer terminal room (SCI 529). To receive each key, you must make a $5 refundable deposit.

**Desk assignment and computer account** During Orientation Week, you will also be assigned a temporary office and desk. This will be your location until you choose a Research Advisor and establish a permanent Department residence. Also, Milton Masud, Director of Computer Resources, will set up a computer account for you, which will give you access to the Department computing facilities.

**Stipends** If you are supported as a Teaching Fellow or as a Research Assistant, you must complete a W-4 form for tax purposes. If you are a student from the People’s Republic of China, you must complete an 8233 form. (Both of these forms are available from the front desk in SCI 299 and returnable to Charles Alongi, the Business Manager). International students should complete I-9 forms at the International Students and Scholars Office (ISSO) located at 19 Deerfield Street (www.bu.edu/issso) and return them to the Business Manager. U.S. students must also fill out I-9 forms, which they can get from the Chemistry Office. You will not receive your monthly paycheck until these forms have been filed. You may pick up your checks from the Chemistry Office on the last business day of each month. You should speak with the Business Manager if you encounter any problems with your reimbursements.

**Social Security Number** All students must have a social security number, which can be obtained at the Social Security Office, 2nd floor of 209 Harvard Street, Brookline (at Coolidge Corner, on the MBTA Green Line). The phone number for the field office is 1-800-772-1213. You must give your social security number to Kevin Burgoyne, the Academic Administrator so that your paychecks can be issued and your registration can proceed smoothly.

**Departmental facilities and procedures**

**Department layout** The Department of Chemistry is quartered in six floors of the Metcalf Center for Science and Engineering. The general layout is as follows:

<table>
<thead>
<tr>
<th>Floor</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>Instrumentation: NMR and mass spectrometers</td>
</tr>
<tr>
<td>First</td>
<td>Teaching laboratories</td>
</tr>
<tr>
<td>Second</td>
<td>Department Office; research stockroom; offices of teaching coordinators; organic research</td>
</tr>
<tr>
<td>Third</td>
<td>Biochemistry, inorganic and organic research; teaching coordinators</td>
</tr>
<tr>
<td>Fourth</td>
<td>Organic, polymer, physical, photochemical, and inorganic research</td>
</tr>
<tr>
<td>Fifth</td>
<td>Physical, organic, and theoretical research</td>
</tr>
</tbody>
</table>

**Computers** The Department has diverse and sophisticated computer facilities that are capable of high-end computation and graphics processing (e.g., Macintosh’s, PC’s, “Linux boxes,” Sun and Silicon Graphics workstations). Terminals throughout the Department are connected via the Department Ethernet, which in turn connects to the University network and then externally to the Internet and beyond.
Every graduate student has a computer account that allows access to the system. You are encouraged to begin as soon as possible to take advantage of this powerful resource. Probably your most important immediate use will be communicating within the Department by electronic mail – email – by which we can instantaneously address each other individually or in groups. You should become familiar with the email facility and get into the habit of checking your messages at least once a day. The system also gives all users access to word-processing, spreadsheet, and database capabilities. Laser printers, located in SCI 299A, are addressed by all terminals on the Department network for preparing hard copies. You should contact the Director of Computing Resources if you have questions about getting started or if you have special computer needs.

**Shared instrumentation** All Departmental instrumentation is located in a newly built Instrumentation Center situated in the basement of the Chemistry Department. The Department operates four research NMR spectrometers, including Varian 300, 400 (x2), and 500 MHz FT-NMRs. The instruments are fully equipped with pulsed-field gradients, multinuclear probes, and variable temperature controls. Graduate students are granted access to these instruments following completion of a required training program.

We also have a 270 MHz JEOL FT-NMR (in SCI 285), intended primarily for instructional purposes. Our Finnegan MAT90, a high-resolution mass spectrometer with GC interface, is available to run samples as a service. There is also a MALDI-TOF mass spectrometer and a GC-MS available for student use. In addition, we have recently added two walk-on LC-MS (liquid chromatography mass spectrometers) which include an autosampler and diode array detector; coupled to single quadrupole or ion trap detectors. With these two new instruments, students can take advantage of soft-ionization technology (electrospray ion source) and obtain either survey masses, or perform detailed fragmentation analyses on complex organic molecules, as well as sequencing experiments on nucleic acids and proteins, coupled to direct access to proteomics and genomics databases.

Two Nicolet FT-IR instruments are available, one coupled to an "IR microscope" and the other with "ATR" attenuated total reflectance capabilities for analyses of surfaces, emulsions, and liquid samples. Finally, the Department maintains an AVIV 62DS circular dichroism spectropolarimeter and a differential scanning, as well as titration calorimeter. In most cases, users can obtain one-on-one instruction in instrumentation operation. Training for both the NMR and mass spectrometers is also provided in the form of periodic "workshops" or "short-courses." Development of "hands-on" experience is an essential component of graduate training.

**Stockrooms** Dry Ice is available in SCI 283. In addition, the Department maintains stockrooms on the first and third floors to serve teaching laboratories.

**Science library** New graduate students are given an introduction to and tour of the Science and Engineering Library, 38 Cummingston Street, during Orientation Week. The URL for the Science Library is: [http://www.bu.edu/library/sel/home.htm](http://www.bu.edu/library/sel/home.htm). Besides learning about the general organization and resources of the Library, you will learn how you can gain access to the entire University card catalogue and a variety of scientific information databases and electronic journals from your computer terminal.

**Placing orders for supplies** Orders for supplies used in teaching or research are handled by the finance component of the Chemistry Department (SCI 299). To order supplies, you must fill out an *Internal Order Form* completely and legibly. The information required includes the correct object code, source (e.g., grant) number, vendor, quantity, catalog number, description, and current price. Research orders must include the grant number and be signed by the professor. The completed form should be left in the "finance basket" at the front desk in the Chemistry office. Most small dollar orders are placed the same day. Orders greater than $1,000 must be made by the Office of Purchasing Service, which can take up to one week to place them. When ordering chemicals, you must indicate whether or not the material is radioactive: the appropriate space must be filled in and all radioactive materials entered on separate order forms. Confirmation of the order will be emailed to the requestor. Email notification of the arrival of any order will be sent to those expecting shipment.

When you receive your orders, check over the items carefully; sign the packing slip accompanying the order; and leave the slip in the finance basket in the Chemistry Office.

To recover petty cash for approved expenses you incurred, first buy the item and get a *sales receipt*. Also, use the Department’s tax exemption number because you cannot be reimbursed for any state sales tax charges without it. (You should request the number from the Chemistry Office.) Fill out a petty cash receipt (obtained from the Chemistry Office), have your professor sign it if the expense is grant-related, and return this form with the sales receipt to the Chemistry Office. You can collect cash immediately if the expense is not over $20. For larger amounts you will be paid by a reimbursement check that will take approximately two weeks to process.
2: Perspectives on Graduate Study

Challenges and opportunities

As new graduate students in chemistry, you are entering a field that is amazingly active and growing at a remarkable rate. From the point at which you start your program to the time you have achieved your degree, there will be staggering developments in biotechnology, materials science, drug discovery, bioinformatics, electronics, photonics, genomics, and proteomics. All of these subfields need trained, creative, and highly motivated scientists to join the expanding research efforts in academia, government, and industry. Our graduate program is designed to provide you with training, experience, and support through course work, research, and mentoring that will prepare you to make important contributions in one or more fields of chemical research and education.

The objectives and expectations of graduate education are very different from those of undergraduate work. The doctoral degree signifies more than the completion of academic requirements or a certain period spent learning facts and methods. The degree is a statement that the holder has reached a level of professional maturity; that he or she has mastered a particular field of knowledge; has accomplished a significant piece of scholarly work; and is prepared to work creatively, critically, and independently in that field. Further, a Ph.D. graduate must know how to communicate his or her work both orally and in writing according to the accepted standards of our profession.

As our graduate alumni prove, students who meet or exceed these requirements can expect to join the very finest research and education institutions in academia, industry, and government.

Respect

A healthy academic environment encourages close, professional relationships among members of the community. The Department is committed to facilitating communication between graduate students and faculty members. For example, we have created Dissertation Advisory Committees to provide each student with several faculty mentors who can advise on research and graduate life. The BUYCC (Boston University Young Chemists Committee) has a mentoring system to assure that new graduate students have access to advice and support from senior graduate students. The Graduate Affairs Committee has two graduate student representatives who bring to the attention of the faculty issues of importance to our graduate student body.

We recognize that there is always room for improvement. It is our goal to create an environment in which no student or faculty member feels isolated or without support or good counsel when they encounter difficulties.

Each member of our Department must recognize that actions that seem fair to one person may be viewed as harassment by another. Good feelings and enthusiasm expressed toward one individual may lead to feelings of exclusion in others. Approaches that effectively motivate one person may lead to distress in others. Each of us – faculty, students, staff – must work to understand how our actions, no matter how well intended, might influence others.

The guiding principle of our Department is that members of our community treat each other with respect at all times.

You should feel free to meet with Tom Tullius, the Department Chair, to discuss any such issues that may be of concern. He and the rest of the Department welcome suggestions and ideas for improving communication within our community. Of course, all such conversations will be considered confidential.

Academic conduct

Academic conduct is an issue of ethics, referring broadly to the proper use of intellectual property. Graduate students should be aware that we operate under a set of Academic Discipline Procedures of the Graduate School, the preamble of which states:

“In order to ensure that the academic competence of students be judged fairly, and to promote the integrity of graduate education, the Graduate School embraces two broad principles: (1) No honest student should be put to a disadvantage because of the dishonesty of another student; (2) Penalties should be commensurate with the misdemeanor … Academic misconduct is a student’s own conduct which intentionally misrepresents his or her own academic accomplishments, or which jeopardizes the fair judging of another student’s work.”
Misconduct obviously includes cheating on exams, copying reports from other students, submitting papers written by others, or other varieties of plagiarism — stealing the words, ideas, and intellectual creations of others and representing them as one’s own. The “Academic Discipline Procedures” define further the nature of infractions and the procedures to be followed to ensure a full and fair hearing of any cases of alleged misconduct. A copy of the “Procedures” can be obtained from the Director of Graduate Studies or from the Graduate School (www.bu.edu/cas/graduate/grsacadcond.html).

Graduate students confront the issue of academic conduct in several ways.

• As students you are subject to the University’s rules and penalties;
• As teachers you are required to enforce these rules in your classes;
• As scientists you are expected to conform to the highest standards of professional integrity.

University regulations make it clear that academic misconduct must be reported. In your function as Teaching Fellow or exam proctor, instances of cheating that you observe should be reported promptly to the head instructor or coordinator in your course.

Misconduct in research has become a national issue in recent years, to the point where it is the frequent subject of newspaper stories and even of congressional investigations. The most extreme cases involve publication of fabricated or falsified experimental results. Going well beyond the consequences to the individuals, these instances of misconduct have threatened the progress of science because they can result in reduction of funding and in over-regulation. Scientists have lost their credibility as a result of careless work and plagiarism. One of our obligations, as faculty and as students, is to convey by example our commitment to the highest intellectual and ethical standards. To do otherwise is to debase the whole scientific enterprise.
3: General Degree Requirements

Graduate School requirements

As a component of the Graduate School, the Department of Chemistry conforms to the Graduate School’s policies and procedures. These general regulations are explained in detail in the Graduate School Bulletin. Except to note a few points of particular importance, they will not be repeated in detail here. You are strongly advised to read over these regulations in the most recent Bulletin carefully (http://www.bu.edu/bulletins/grs/).

Course requirements The Graduate School defines the minimum number of courses (course credits) required for the M.A. degree as eight (32), for the post-bachelor’s Ph.D. as sixteen (64), and for the post-master’s Ph.D. as eight (32).

Continuing student status After all departmental course requirements for the M.A. or Ph.D. degree have been satisfied (see below), candidates must register each semester as continuing students until all requirements for the degree are completed. Continuing students are charged tuition at a substantially reduced rate but are still entitled to all of the usual rights and privileges of full-time students. Students must be registered in the semester in which they complete their degree requirements, including presenting and defending the Ph.D. dissertation.

Full-time status For legal purposes and to qualify for certain fellowships, it is often important for students to be certified as full-time. This status is defined by the Graduate School as registration for at least three full semester courses (at least 12 credits) or engaged “full-time” in teaching or research in pursuit of a degree. Teaching Fellows or Research Assistants are considered full time if they are registered for two or more full courses. If you register for fewer than three courses in any semester, including continuing student status, you must file a full-time certification form signed by your faculty advisor and the Department chair.

Residency and time limit Ph.D. candidates must satisfy a residency requirement of at least two consecutive regular semesters of full-time study at the University. The post-bachelor’s Ph.D. program must be completed within seven years after the first registration and the post-master’s program within five years. Extension of these time limits requires submission of a petition approved by the faculty advisor and the Department chair.

Academic standards and termination The Graduate School defines B- as the minimum passing grade in all courses. A student who receives failing grades in more than two semester courses (or more than a total of eight credit hours) is automatically terminated from the graduate program.

Petitions You may request waiver or modification of any Department or graduate school regulation through the petition process. Petitions should be submitted to the Associate Chair for Graduate Affairs using the prescribed form obtainable from the Graduate School or, for strictly Departmental matters, in the form of a letter. Before filing a petition, you should discuss the question at issue with your faculty advisor and with the Associate Chair, Stan Hartman. They must each indicate their approval or disapproval of the request.

Departmental requirements

In the following sections Departmental procedures are described for the benefit of both students and faculty. The requirements are stated and followed by some comments about procedures, rationale, and evaluation and include:

• Course work: programs of study
• Completion of CH801
• Attendance at colloquia and seminars
• Selection of Research Advisor and registration for research
• Qualifying examinations (see Part 4)
• Language (see Part 4)
• Dissertation; oral defense (see Part 4)

In addition, there is a description of how students must fulfill their duties and responsibilities of Teaching Fellows (see Part 5).

Course work: programs of study

Academic programs of entering students are prepared in consultation with an advisor appointed by the Graduate Affairs Committee, taking into account the special interests of the student and the results of the diagnostic exams. After selecting a Research Advisor, the two of you will prepare an Outline of Study. Changes in your program of study require your advisor’s approval. Each of the specializations in the Department has an associated program of graduate courses that include both basic (600-level) and advanced (700-level)
To help you gain information about the available opportunities, the Department runs a special series of Research Saturdays – seminars early in the fall semester in which faculty members describe their research activities. Brief presentations from four or five faculty members will be followed by a poster session, with participation of faculty and students from each group. The setting is informal; and there is opportunity for discussion, to ask questions, and to meet faculty and students.

Attendance at Research Saturdays is required of all first-year graduate students.

As a second part of the selection process, you are encouraged to discuss your mutual research interests with individual faculty. You must select Research Advisors and register for research by the 15th of December of your first year in the graduate program.

**Graduate Research Methods and Scholarly Writing Course**

The CH801 Graduate Research Methods and Scholarly Writing course will be taught each Fall. The two-credit course, which meets once a week, is required for all first-year students in our graduate program. They are expected to complete this course during their first year of study. Members of the faculty, staff, and graduate students will typically teach the course.

The course is designed to introduce beginning graduate students to the fundamental methods of research and scholarship necessary for a successful career as a graduate student, teacher, and independent research scientist.

It will address a number of issues faced by all graduate students such as: the selection of a Research Advisor; how to be an effective research scientist and teacher; and preparation for qualifying examinations. Topics related to developing a familiarity with essential “tools” of the research scholar, including the use of archival literature and less formal sources of information, will be developed in detail. A special emphasis in the course will be placed on developing skills for effective scientific writing and oral presentation.

**Selecting your Research Advisor and registering for research**

One of the most important decisions facing every new graduate student in the first year is the selection of the major professor or Research Advisor. Choosing an advisor requires that you have decided on your area of intended specialization.

<table>
<thead>
<tr>
<th>Specialization</th>
<th>Basic Courses</th>
<th>Advanced Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry</td>
<td>CH621, 622</td>
<td>CH721, 722, 723, or 724</td>
</tr>
<tr>
<td>Inorganic</td>
<td>CH631, 632, 633, 634</td>
<td>CH731</td>
</tr>
<tr>
<td>Organic</td>
<td>CH641, 642, 643</td>
<td>CH741, 742, 743 or 744</td>
</tr>
<tr>
<td>Physical/Theoretical</td>
<td>CH651, 652, 654, 655</td>
<td>CH656, 751 or 752</td>
</tr>
</tbody>
</table>

**Colloquia and seminars**

The Department sponsors formal afternoon Colloquia on Mondays at 4 PM. These colloquia are given by respected leaders in chemical research and education from academia, industry, and the government. Individual divisions in the Department hold less formal research seminars that provide a forum for presentation and discussion of work going on in this Department. These seminars include the Physical Chemistry Seminar on Wednesdays at 3 PM and periodic CMLD Seminars. (The CMLD – the Center for Chemical Methodology and Library Development at Boston University — [www.bu.edu/cmld](http://www.bu.edu/cmld) — is a National Institutes of Health-funded Center of Excellence for the synthesis of chemically diverse libraries. It is located within the Department.)

The speakers in these research seminars include your fellow students, who present their own work and that of their research groups. The purpose of these seminars is to keep us all - faculty and students - abreast of significant new developments in the world of chemistry inside and outside the Department. These idea exchanges are among the most important mechanisms for education at the graduate level, providing both depth in particular topics and breadth of exposure to many different subjects.

Two important aspects of the colloquia should be pointed out: The announcement of each event includes an abstract provided by the speaker, often a helpful summary to read before the talk and, afterwards, a useful reminder of the topic discussed. As a rule, colloquia speakers spend the day visiting the Department to meet with faculty and graduate students. We try to allow time during each visitor’s day to meet individually with interested graduate students. We encourage all graduate students to take advantage of these opportunities to meet our speakers, who are authorities in their special fields.
In addition to the Departmental seminar series, many faculty-led research groups regularly hold their own group meetings to discuss their research projects in detail. Graduate students are encouraged to attend and participate in the topical seminars in their fields of interest. You will usually be welcome to attend individual group seminars; just ask the professor in charge.

One of the attractions of doing graduate work in the Boston area is its concentration of outstanding academic institutions, the aggregate of which creates an intellectual atmosphere that is equaled by few places in the world. This atmosphere arises in part from the flow of scholars through the city and their presentations at Boston University and other local institutions. A notable result of this synergy among universities is the BU-Harvard-MIT Joint Theoretical Chemistry Lecture series (http://people.bu.edu/therchem/), which presents monthly, three-hour, “short course” seminars designed to introduce graduate students and postdoctoral fellows to current areas of research in chemistry.

Almost every day of the week you will be able to find a seminar of some interest to you. Obviously, you may not have the time to go to a talk every day! However, you should read the announcements of upcoming events on our bulletin boards and check seminar listings on other department web sites. We encourage you to take advantage of opportunities to hear from world authorities about topics of vital importance to your research.

The M.A. in chemistry

While the Department primarily accepts students intending to pursue the Ph.D. degree, we also admit candidates for the M.A. degree. We define requirements for the M.A. in Chemistry that are consistent with the general ones of the Graduate School. The Graduate School uses the calendar shown below.

Entrance criteria are the same for both M.A. and Ph.D. students. Of the requirements listed above for the Ph.D. degree, those relating to qualifying exams and the dissertation do not apply to M.A. students. Students may satisfy the Graduate School language requirement for the M.A. degree either by meeting that set for Ph.D. students or by having completed two years of a foreign language at the undergraduate college level (see the GRS Bulletin for more details).

Course requirements A minimum of eight graduate-level courses (32 credits) in chemistry, at least five of which are non-research, is required for the M.A. degree. Of the five non-research courses, two must be outside the candidate’s major area of specialization and at least four must be at the 600-level or above. Two non-chemistry courses acceptable for graduate credit in mathematics or natural sciences may be substituted for chemistry courses. Your selection of courses is dependent on your interests, background, and the recommendation of your advisor.

Research A minimum of two research courses (8 credits) is required. Evaluation of a candidate’s research work is based on the level of performance and on a written report to be submitted to the faculty advisor at the end of each semester. Note that no thesis is required for the M.A. degree in Chemistry.

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**BOSTON UNIVERSITY GRADUATE SCHOOL**  
**GRADUATION CALENDAR 2003-2004**  
**FOR M.A. DEGREE CANDIDATES**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>January 2004</th>
<th>May 2004</th>
<th>September 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application due in Graduate School Office (forms available in the GRS Office)*</td>
<td>1 November 2003</td>
<td>1 February 2004</td>
<td>1 July 2004</td>
</tr>
</tbody>
</table>

*The diploma application is valid only for the graduation date specified; a new application must be filed if the student does not graduate as planned.
4: Requirements for the Ph.D. in Chemistry

Course requirements

Candidates who enter with a bachelor’s degree must complete a minimum of sixteen graduate-level courses (64 credits) in chemistry, at least five of which must be non-research courses. Of the five non-research courses, two must be outside the candidate’s major area of specialization, and at least four must be at the 600-level or above. Students may petition to be excused from non-research courses on the basis of equivalent courses taken elsewhere. Two non-chemistry courses acceptable for graduate credit in mathematics or natural sciences may be substituted for an equal number of chemistry courses. The balance in the total of the sixteen required courses must be in research. The requirements for candidates who enter with a master’s degree are as described above except that the total number of courses can be reduced, in approved cases, from sixteen to eight.

Dissertation Advisory Committee

By October 15th of the second year, each student, in consultation with his or her Research Advisor, will select the members of a Dissertation Advisory Committee (DAC) and submit the proposed list of names to the DGS, John Straub, for approval. This committee will consist of three to five faculty members, including the Research Advisor, and may include faculty from outside the Department or from other institutions. At least three members of the committee should be from the Boston University Chemistry Department. With approval of the major advisor and the GAC, the members of the DAC may be changed during a student’s graduate career to assure an effective committee composition.

The DAC plays an important role in the graduate studies of the student. The responsibilities of the DAC include:

- Meeting with the student on a regular basis to monitor progress and to act as a source of additional information and expertise.
- Serving as part of the Second Year Oral Qualifying Examination committee.
- Serving as members of the Independent Research Proposal examination committee.
- Participating as dissertation readers and members of the Dissertation Examination Committee.

These functions of the DAC are described more fully in the following sections.

Qualifying examinations

The Graduate School requires that Ph.D. candidates pass qualifying examinations set by the departments. The qualifying exam in Chemistry has two parts: a series of written exams and an oral exam based upon a written proposal submitted by the student describing his or her dissertation research project. These two parts of the examination are described here, along with suggestions on how to successfully prepare for them.

Part 1: Written examinations

This part of the qualifying examination consists of a series of written exams. Two one-hour exams, in different sub-disciplines, are offered once each month. Students may begin taking the exams at any time during their first academic year but must start no later than February. The sequence must be completed by May of the second academic year except that each student will have no more than 16 consecutive opportunities to take the exams once he or she has started the sequence. Students may take as many exams during this period as they choose. By the end of the period each student must have passed a total of four exams. For students who enter the graduate program in January, the examination sequence must be started by May of their first year and completed by August of their second year.

The sequence aims to present a balance of exams in each of the sub-disciplines: biochemistry, organic, inorganic, and physical/theoretical. Each member of the graduate faculty sets at least one exam and at most two during the 16-month cycle. The cumes are held in SCI 294 on the third Saturday of each month, starting at 10 AM. On Friday of the week preceding the exam, the names of faculty submitting questions and the subjects to be covered are posted on the graduate bulletin board (on the second floor, outside the Chemistry Office). The exams are graded on a PASS/FAIL basis by the faculty member setting the questions, usually after consultation with other faculty in the same field. The results of the exams (passes only), at times with model answers to the questions, will be posted within two weeks of the exam.

The primary purpose of the cumes is to ensure that students have reached a satisfactory level of understanding fundamental aspects of chemistry and are prepared to pursue independent research for the Ph.D. dissertation. Several types of demonstrations of knowledge might be asked in the cumes, for example:
• Questions testing knowledge of the basic concepts of a particular field. Such questions might come from material covered in a graduate course; e.g., discussing various mechanistic possibilities for a given reaction or deriving and relating important equations from physical chemistry.

• Analysis of a published research article. You might be given information from a recent article and asked to interpret the results or to discuss the validity of the conclusions drawn by the authors. A broad knowledge of the current literature would clearly help with questions of this kind.

• Designing a procedure for synthesis or analysis. You might be asked to devise a route for synthesis of a given compound or to describe methods for characterizing a compound. A thorough understanding of chemical methodologies and the ability to apply them creatively to new problems are tested by this kind of question.

• Questions relating to topics discussed by speakers at the Departmental colloquia and seminars. Students who have attended and understood the material presented should be well prepared for questions of this sort.

As you can see from these examples, the cumes are intended to test your mastery of graduate-level course work, your ability to reason independently, and your success in keeping abreast of recent work, all of which are necessary attributes for an independent research scientist. These exams are intended to encourage a continual program of learning through course work, research, reading, and attendance at seminars.

**Part 2: Research proposal and oral exam** This part of the qualifying examination requires each student to write a proposal describing his or her dissertation research project and to respond to questions about the proposal in an oral exam. Abstracts describing the planned proposal are due December 1st (September 1st for students admitted in January). The proposal, ordinarily 7 to 10 pages in length, should be devoted to the background, experimental design, objectives, and significance of the problem. A bibliography must be included. The oral examination may be taken beginning in either November or February of the second year, as agreed upon by the student and the DAC. The examination committee must consist of at least three voting members. The oral examination must be scheduled by February 1st (November 1st) and completed no later than March 15th (December 15th).

The written proposal must be submitted to the members of the examination committee (the DAC) at least one week in advance of the oral exam. In this exam, candidates will present a 15–20 minute introduction and then respond to questions from the committee about the proposal and the basic science underlying the research. Members of the examining committee (excluding the major advisor, who does not vote) will evaluate the proposal, the presentation, and the responses to questions as “HIGH PASS,” “PASS,” “CONDITIONAL PASS,” or “FAIL.” A candidate who receives a “CONDITIONAL PASS” evaluation must retake and pass the examination, or meet other specified expectations of the committee, before the end of the second semester. The Committee’s report will specify the areas in which the student shows deficiencies. A “FAIL” on the examination indicates that the student’s performance was not acceptable; the exam may not be retaken.

The purposes of Part II of the qualifying exam are to stress critical and creative thinking, to ensure that students are familiar with the literature relating to their research areas, and to provide experience in written and oral communication. Communication skills are only learned after much practice, and usually with the helpful criticism of your faculty advisor.

A well-written paper seldom happens in the first draft. It requires a number of revisions with careful attention to content, organization, and expression. A good proposal requires a sound scientific base. The background provided by formal course work and surveys of the relevant literature are essential before forming the written proposal.

**QUALIFYING EXAMINATION CALENDAR**

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<thead>
<tr>
<th>Program Start</th>
<th>September</th>
<th>January</th>
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<tr>
<td>Start</td>
<td>January first year</td>
<td>April first year</td>
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<tr>
<td>Completion</td>
<td>May second year</td>
<td>November second year</td>
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<tr>
<th>Part 2 (Research proposal and oral examination)</th>
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<tbody>
<tr>
<td>Written proposal due</td>
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<tr>
<td>Oral defense</td>
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Chemistry Graduate Program Handbook
**Advancement to Ph.D. candidacy**

To be recommended for advancement to candidacy for the doctoral degree in the Department of Chemistry, a student must have:

- Completed his or her required non-research course work (with five courses, at least four at the 600 level or higher and at least two courses outside of the candidates’ area of specialization).
- Received no more than eight failing credits (typically two courses) of less than B- (including formal research, seminars, and teaching courses).
- Completed and passed the written and oral qualifying examinations.
- Demonstrated significant progress and potential in his or her dissertation research.
- These rules are written in the best interest of the student, the Research Advisor, and the graduate program as a whole. This evaluation is made at the end of the spring semester of the student’s second year.

**Student progress after advancement to candidacy**

A student in her or his third year and thereafter must present an annual progress report to the DAC by the end of May each year. The report is to be a 2 or 3 page written summary of research progress and plans. The student must schedule a meeting with her or his DAC to discuss the report by the end of June. Committee members must receive the report at least one week before the meeting. If a meeting with the entire DAC cannot be scheduled, it can be conducted if two members of the DAC can attend. However, within any two-year period, every member of the DAC must attend at least one meeting.

After each meeting, the student must file an annual committee meeting form with the Academic Administrator. This form must be signed by the members of the DAC. If the student makes a public presentation during the year of research progress in a forum attended by at least two members of the DAC, the annual meeting will be waived. However, the student must file a public research presentation form indicating approval by all committee members. The student may still request a committee meeting. All forms can be downloaded here:

[http://www.bu.edu/chemistry/grad/requirements/](http://www.bu.edu/chemistry/grad/requirements/)

**Advanced-year public presentations**

By the end of the fourth year and at least six months before the final dissertation defense, the student must present a public report on her or his ongoing research and file the public research presentation form with the Academic Administrator. Acceptable forums for this presentation include external conferences or meetings and Departmental seminar series, such as the Physical Chemistry Seminars or Metalmania. Students should inform the DAC members of the time of the presentation so that at least two members can attend.

**Independent research proposal**

The DAC may encourage a student to submit and defend an independent research proposal following advancement to candidacy. This is an optional activity and will earn a special Departmental recognition.

The independent research proposal must be the original work of the candidate. It should not be derived directly from any research the candidate has previously done. A proposal will be deemed to lie outside the dissertation area if the literature survey required for its preparation shows minimal overlap with that required for the dissertation. The candidate can defend his or her independent research proposal at any time after advancement to Ph.D. candidacy and up to six months before the final dissertation defense. The members of the candidate’s DAC must approve the proposal topic prior to the beginning of an in-depth investigation of the area. It is the candidate’s responsibility to verify with the DAC members both the nature of the proposal and the members’ availability for the exam.

The written proposal, 10–20 pages in length, should be presented in the format of a grant proposal with sections describing:

- Specific aims
- Background
- Experimental plan
- Interpretation of results
- Literature cited

The proposal is expected to be polished and indicate a mature grasp of the scientific method. The candidate will present a 20- to 30-minute talk describing the proposed project, including the background and its specific aims. An experimental plan and discussion of how the results will be interpreted should be presented. The candidate should be prepared to discuss potential problems with the approach and describe alternative approaches that might be used to circumvent these problems. A student whose written proposal or defense is deemed acceptable will be recognized with the Lichten Award for Excellence in Graduate Research.
Language requirement

Candidates must demonstrate the ability to read scientific literature in German, French, Russian, Japanese, or Chinese as approved by the DAC. Candidates whose native language is one of the above may present English as their second language. Language exams are given in November, April, and July. The language requirement must be satisfied before the candidate’s dissertation outline will be accepted by the Graduate School.

The examination consists of translating a passage from the chemical literature into English. The Department of Chemistry selects the passage. Grading is done by the Modern Foreign Languages Department. Students are strongly advised to review and to practice their language skills before taking the exam. Preparatory courses are available for students who need substantial help.

Dissertation and defense

Ph.D. candidates must complete a research program acceptable to the major professor and present a dissertation approved by the major professor and a second reader. The Graduate School strictly specifies the format of the dissertation and other regulations concerning its presentation. You should consult the Academic Records Officer of GRS for complete details. For the information of students expecting to complete Ph.D. work in 2003/04, a Graduate School Calendar is included below showing deadlines for submitting the dissertation outline and the various steps required for final approval of the dissertation.

Dissertation outline or prospectus The dissertation outline/prospectus is a document that must be submitted to the Graduate School by a Ph.D. candidate upon successful completion of course requirements and qualifying examinations. It may be submitted either as an outline or as a prospectus. The document constitutes a detailed description in clear, grammatical English of the proposed dissertation. It includes a statement of the candidate’s thesis and methodology, and a description of the proposed structure of the dissertation by chapter. It provides a detailed summary of the proposed organization of the dissertation and indicates the primary and secondary topics to be discussed. The document must be accompanied by signatures indicating the approval of each of the student’s dissertation readers and the Department Chair.

Dissertation abstract The Graduate School requires students to submit an abstract of the completed dissertation with the final Ph.D. oral examination schedule at least two weeks before the examination date. Late filing of the abstract may result in postponing the date of the final oral exam. Guidelines for preparing the abstract and the dissertation, according to the requirements of University Microfilms International, are distributed by GRS to all doctoral candidates. Although students will have an opportunity to make final revisions to the abstract after the oral defense, they should not regard this first version as a “rough draft.” It must be of high quality because it is the only version circulated by GRS to the members of the examining committee, GRS, and the Office of the Vice President. A final version of the abstract is submitted with the definitive version of the dissertation for publication in Dissertation Abstracts International.

It is important to prepare the abstract with care. In addition to being published by Dissertation Abstracts International, in some cases it may be the only public manifestation of the research work. The dissertation itself is held in the library at Boston University. The University thus is properly concerned about the quality of the abstract. It is reviewed by the Associate Dean of the Graduate School, the Dean, by the Office of the Executive Vice President, and, in some cases, by the President.

The abstract should be a concise summary of the ideas and results presented in the dissertation. It may include a brief statement that establishes the context of the work, but the abstract should not be a second introduction. Similarly, research methods and results should be summarized, but these should not repeat at length material presented in the body of the dissertation.

The abstract (and dissertation) should accurately reflect the candidate’s contribution to the work described. In the sciences, it is common for a graduate student’s research project to be performed as part of a group effort. Published articles are often presented as the results of the collective group, frequently containing references to “the group” or using the third person plural (“we found that...”). It is very important to recognize that a Ph.D. dissertation is significantly different from a scientific research publication. It must be an accurate record of the candidate’s own work, while making absolutely clear the contributions of other individuals to the research program.

It is the candidate’s responsibility to submit a draft of the abstract for review and approval by the Research Advisor (first reader), then to the DGS and the Department. These reviewers need adequate time to perform their reviews. Their signatures on the GRS abstract cover sheet signify that the content and style meet Chemistry standards. It is the responsibility of the candidate to file the abstract and cover sheet with GRS.
**Dissertation** Preparing a high-quality dissertation often takes much longer than most students recognize. Candidates should allow several months for writing the document. Many students find it helpful to begin with the more “routine” sections, such as the “materials and methods.” The introductory section usually requires a major review of the broad area of research related to the dissertation topic. The candidate should prepare that section after consulting with his or her advisor about the appropriate issues to include. We recommend that the student consult regularly with the first and second readers of the dissertation during the drafting process to avoid any potential problems with style and content that may require a major rewriting effort. This concern is as important with figures and tables as it is with the text. Candidates should consult with the first and second readers before setting a defense date.

It is usual that two or three drafts of the entire dissertation will be required to put it in a form acceptable to both first and second readers. Only then is it ready for distribution to members of the candidate’s examination committee (the DAC and any other appointed members). All members of the examination committee must have received a complete copy of the dissertation at least seven days before the final oral examination in order to undertake their careful reading of the document.

**Dissertation defense: final oral exam** A Ph.D. candidate must defend her or his dissertation in an oral examination. The first part of the examination is open to members of the academic community at large, and consists of a 30- to 60-minute presentation followed by an informal discussion period. In the second part of the examination, which is open only to members of the examination committee, the candidate must defend the dissertation as a worthwhile contribution to scientific knowledge and demonstrate mastery of the field of specialization as it relates to the dissertation. The examining committee consists of at least five Graduate School faculty (usually the DAC) and must include at least three members of the Department and other members approved by the GAC in consultation with the dissertation readers. At least two of the readers and the chair must be members of the Department. If the first reader is not a member of the Department, second and third readers must be appointed from among Departmental faculty. A member of the committee other than the first or second reader serves as chair.

<table>
<thead>
<tr>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td><strong>Requirement</strong></td>
<td><strong>January 2004</strong></td>
</tr>
<tr>
<td>Dissertation Outline due in Graduate School (GRS Office) (forms available in GRS Office)</td>
<td>4 April 2003</td>
</tr>
<tr>
<td>Diploma application due in Graduate School Office (forms available in GRS Office)*</td>
<td>1 November 2003</td>
</tr>
<tr>
<td>First Draft of dissertation submitted to readers</td>
<td>3 October 2003</td>
</tr>
<tr>
<td>Dissertation abstract (350 words) due in GRS Office for review and approval by Deans</td>
<td>At least three weeks prior to Final Oral Exam</td>
</tr>
<tr>
<td>Schedule of Final Oral Exam (to be arranged by the Department of Chemistry) due in GRS Office with 14 copies of approved abstract</td>
<td>Two weeks prior to Final Oral Exam</td>
</tr>
<tr>
<td>Last date to hold Final Oral Exam</td>
<td>12 December 2003</td>
</tr>
<tr>
<td>Approved and signed dissertation (2 copies) due in the GRS Office**</td>
<td>12 December 2003</td>
</tr>
</tbody>
</table>

* The diploma application is valid only for the graduation date specified: a new application must be filed if the student does not graduate as planned.

** All Ph.D. requirements are complete only when both copies of the dissertation have been certified as meeting the standards of the Graduate School and are accepted by the Library.
5: Fellowships and Research Assistantships

The principal kinds of financial assistance available to support graduate work include Teaching Fellowships, Research Assistantships, and fellowships or scholarships awarded directly to individuals. Because of the importance of Teaching Fellowships in our Department, especially in supporting new students, they are treated in more detail below. Further information about financial aid may be found in the Graduate School Bulletin or obtained from the Financial Aid Office of the Graduate School.

Filing applications for support

Note this important point: Each student is ultimately responsible for his or her application for financial aid.

All students supported by fellowships or assistantships must obtain a Financial Aid Application (from GRS or the Chemistry Office), fill out the top part with the personal information requested, and return the form to Kevin Burgoyne, the Academic Administrator. He can assist you in completing the form. However, only you know (or should know) what your base of support will be and you must take the initiative in starting the process. You will not receive stipend checks or be allowed to register for courses until GRS has received the completed application. Therefore, you should be sure that the papers are filed well in advance of the start date. The Financial Aid Office (GRS) requests that completed applications be submitted by April 1 for the academic year starting in September. If after you have submitted an application for Financial Aid there is a change in your base of support, please see the Academic Administrator for assistance in making sure the changes are promptly and correctly forwarded to GRS. See the section below for information about applying for a Teaching Fellowship.

Research Assistantships

Research Assistants (RAs) are graduate students supported from research funds controlled directly by faculty members. Ordinarily, only students who have chosen a Research Advisor and who are actively engaged in research are appointed as RAs. As a result these awards usually go to advanced students. In general, Research Assistantships provide annual stipends at least equal to those of Teaching Fellowships and provide support during the summer months. Although the policies of granting agencies differ and, in certain cases special arrangements must be made, tuition costs of RAs are usually covered by the research grant.

University merit fellowships

Outstanding applicants to our graduate program may be offered the support of a research fellowship that provides a stipend and tuition. The Dean’s Fellowship is offered by the Graduate School and currently provides a stipend for the nine-month academic year at an annual rate of $23,750 in addition to a full tuition scholarship. The Clare Boothe Luce Fellowship provides support for select female graduate students for two years and currently provides a stipend for the nine-month academic year at an annual rate of $23,750 in addition to a full tuition scholarship.

Direct fellowships and scholarships

Direct fellowships and scholarships are awarded to individuals (typically with the support of the Department and/or faculty advisor). These fellowships often have restrictions attached, such as particular areas of study (for example, American Cancer Society or the Organic Division of the American Chemical Society) or American citizenship (for example, most of the federally-funded programs of the National Science Foundation and the National Institutes of Health). They are also highly competitive on the national scale. The Department usually receives announcements of fellowship programs for which our students may be eligible. We forward these announcements to faculty and students, and we offer our full encouragement and support to students who wish to apply for these fellowships. If you plan to apply, contact Katinka Csigi, the Grants Development Administrator, who will assist you.

Teaching Fellowships

Teaching Fellowships (TFs) are allocated by the College of Arts and Sciences/Graduate School to the Department to meet specific needs in delivering the academic program. We also receive a small number of TF stipends from the University’s Metropolitan College. Teaching Fellowships are the Chemistry Department’s major means for supporting first- and second-year graduate students and thus for maintaining the entry of new graduate students into our program.

The Department oversees the preparation for teaching of our TFs and evaluates their performance regularly to assure high standards. The undergraduate teaching requirements in chemistry determine how our positions are allocated. For example, we need a large number of TFs to staff laboratory sections and fewer to facilitate discussions. The latter assignments are generally given to more experienced TFs and those with excellent spoken English skills. Besides the standard
Teaching Fellowships assigned during the regular academic year, a few positions are available to teach in our Summer Term course offerings. We use these positions to recognize outstanding teaching performance during the academic year.

**TF stipend/tuition scholarship** Teaching Fellowships are awarded for two semesters to first-year students and one semester at a time to other students. Students in the first year of study are guaranteed a full, twelve-month stipend. The CAS/GRS fellowships currently carry a stipend for the academic year at an annual rate of $23,250. In addition, the student receives a tuition scholarship for two or three courses (eight or twelve credits) each semester, as agreed upon by the student and academic advisor, until the student’s course requirements have been satisfied. The continuing student fee is covered thereafter. Summer Teaching Fellowships carry a stipend for the six-week sessions at the same annual rate, but they do not provide tuition.

It is important for students to realize that academic year stipends are paid in four equal monthly installments each semester. The last payment for the spring semester is at the end of April. If you are a summer TF, your first check will not come until June or August (depending on whether you teach first or second summer term). Therefore, you should plan on budgeting your resources over May and June when you may not be receiving stipend checks.

**Medical insurance** As part of your financial aid as a TF, RA, or recipient of a university merit scholarship, the University will credit your student account for your individual participation in the BU Medical Insurance Plan. In each academic semester (Fall or Spring) in which you are a TF or RA, a credit payment for half the annual cost of the University Medical Insurance Plan will be made directly to your student account in approximately the fifth week of classes. The credit payment for medical insurance may be taxable as income to you, so if you have alternatives for health coverage, it may be to your advantage to waive the University Medical Insurance Plan. It is your responsibility to report income to the Internal Revenue Service and pay taxes as required. For additional information, you should consult the following websites:

Student Accounting Services  
(http://www.bu.edu/comp/saweb/medins.html),

Student Health Services  
http://www.bu.edu/shs/pages/insurance.html

Graduate Student Organization  
http://people.bu.edu/gso/healthcare/

**Preparation for teaching** To ensure basic competency in English, we require all Teaching Fellows for whom English is not their native language to achieve an aggregate score in the TOEFL exam of at least 600. In addition, TFs who need extra tutoring in English will be required to participate in a special series presented by CELOP, which is held during the first semester. The Department offers an intensive introduction to teaching for new TFs during the orientation period in the fall before classes start. This introduction stresses the critical role that TFs play in our teaching program. It outlines how they can perform their duties most effectively and includes issues of safety and some practice teaching.

All TFs at Boston University are required to register each semester for a 2-credit seminar in teaching their discipline. This seminar consists of regular meetings with the course instructor or coordinator to discuss the content and presentation of the course material. Registration for the teaching seminar will not affect your tuition or the number of academic or research courses required for the degree.

**Evaluation and reappointment** To help TFs improve their teaching skills, supervising instructors regularly observe them in the classrooms and laboratories and inform them of their performance. Each semester all aspects of our courses, including performance of Teaching Fellows, are evaluated and the results of the evaluations are used as the basis for continuation of appointment. The evaluation includes both responses from students enrolled in courses and observations by supervising instructors. Superior teaching performance is recognized in the form of prizes for excellence in teaching, awarded each year by the CAS (http://www.bu.edu/chemistry/grad/awards/). The Chemistry Department is very pleased to note that several of our TFs have received this distinguished award in the recent past. Seriously deficient evaluations may be the basis for probationary action, including withholding or withdrawing Teaching Fellowship appointments.

**Assignment of Teaching Fellowships** The Department administers its allotted Teaching Fellowships, assigning them to our graduate students on the basis of performance and need. As a matter of general policy, we give priority to first- and second-year students, recognizing that more senior students frequently have support available to them as Research Assistants. Assuming continued satisfactory teaching performance, the Department makes every effort to assure graduate students of TF appointments through their second year in the program. We recognize a joint responsibility of more senior students and their advisors to develop other forms of support, including grant-supported Research Assistantships and direct
(external) fellowships. Ordinarily, the time limit set for TF support is a maximum of four years. Extensions beyond two years are given only when there is evidence that alternative sources are actively being sought.

Teaching Fellowships are not automatically awarded. Students beyond their first year must specifically apply each semester to the GAC for support as TFs. Teaching Fellowships are awarded on a case-by-case basis as availability allows.

Responsibilities of Teaching Fellows

Graduate TFs are an extremely important component of the teaching functions of the Department. TFs are frequently the most immediate source of help and supervision in the teaching laboratories that serve large numbers of undergraduate students, many of whom are inexperienced. Responsibilities include effective and informed instruction in the content of chemistry and proper laboratory skills, as well as constant attention to safety issues. The following is a brief reference to procedures in effect in all chemistry laboratory courses, stressing teaching responsibilities and safety issues. The supervisors in charge of each course provide more detailed information.

Preparation TFs must perform the laboratory exercises before meeting with their students. Your supervisors will inform you of arrangements for these preparation sessions. As a TF, you must attend scheduled staff meetings and become thoroughly knowledgeable about laboratory protocols. You must become familiar with the procedures, lists of materials provided, and the proper use of these materials in the exercises.

Supervision Of your assigned teaching duties, supervision has the highest priority! We are legally required to provide active and continuous supervision in all teaching laboratories. Therefore, it is mandatory that you be in the laboratory during your assigned periods and that you give your full attention to the conduct of your class.

Absences If for any reason (such as illness) you cannot meet or must leave a regularly scheduled class, you must make arrangements with another TF to take your place and inform your supervisor of the change. In an emergency, contact your supervisor or the Chemistry Office.

Safety TFs share major responsibility, including legal responsibility, for the safe conduct of their laboratory classes. In addition to being prepared yourself, you must instruct your students concerning general laboratory safety practices and particular hazards associated with each exercise. You are responsible for enforcing all safety regulations, in particular the wearing of safety glasses and the proper disposal of hazardous wastes.

Hazardous waste disposal All broken glassware (and only broken glassware) must be disposed of in the special boxes or cans designated for that purpose and not mixed in with the regular trash. This precaution is to protect the custodians from injury. All used glassware must be rinsed clean of residues with water or acetone, as appropriate, before it is placed in the dirty glassware bins (in laboratories using the community equipment plan). All hazardous chemical wastes must be disposed of in the approved and specified manner. Stockroom personnel who clean up equipment and materials have been injured because of carelessly disposed waste materials.

Reporting accidents In the event of an accident requiring immediate attention, dial the BU Police (3-2121) and report clearly the nature and location of the accident. The police are qualified to deal with emergencies, but you must be available to give them as much information as you can about the nature of the accident. We must file an accident report on every incident that occurs in our teaching and research laboratories. You must report all accidents, whether serious or minor, to your laboratory supervisor or to the Chemistry Office.

Housekeeping Although students are responsible for keeping their work areas clean and orderly, it is up to the teaching staff to enforce these rules. These tasks include cleaning up workspaces before leaving the laboratory and leaving common areas orderly (for example, hoods, reagent shelves, balance and instrument areas). Let your students know from the beginning that cleaning-up is a required part of the laboratory exercise; otherwise, it will be your responsibility.

Relationships with students As a member of the Department’s teaching staff, you must conduct yourself in a strictly professional way to ensure fair and impartial treatment of all students. There must be no social involvement with your students or other interactions that could be interpreted as showing favoritism in either a positive or negative way. An area of teacher-student interaction of particular sensitivity is that of sexual harassment. This term covers behavior ranging broadly from using language with a sexual overtone to overt physical contact; from the implication that a student’s grade depends on favors to an outright “proposition.” As a teacher, you must be on your guard against compromising situations that could lead to an accusation of sexual harassment. A misinterpretation of motives is most likely to arise during one-on-one meetings. Therefore, it is good practice to have a third person in the room and for the door to be open.
John Caradonna  
Associate Professor  
Inorganic and Bioinorganic Chemistry  
Ph.D. - Columbia University

Richard Clarke  
Professor  
Physical and Biophysical Chemistry  
Ph.D. - University of Pennsylvania

David Coker  
Professor  
Theoretical Physical Chemistry  
Ph.D. - Australian National University

Dan Dill  
Professor  
Theoretical Molecular Physics  
Ph.D. - University of Chicago

Sean Elliott  
Assistant Professor  
Bioinorganic Chemistry  
Ph.D. - California Institute of Technology

Rosina Georgiadis  
Associate Professor  
Physical and Analytical Chemistry  
Ph.D. - University of California - Berkeley

Warren Giering  
Professor  
Organometallic Chemistry  
Ph.D. - SUNY at Stony Brook

Mark Grinstaff  
Associate Professor  
Inorganic/Materials Chemistry  
Ph.D. – University of Illinois

Standish Hartman  
Professor and Associate Chair  
Biochemistry  
Ph.D. - Massachusetts Institute of Technology

Morton Hoffman  
Professor  
Physical/Inorganic Chemistry  
Ph.D. - University of Michigan

Guilford Jones  
Professor  
Physical Organic Chemistry/Photochemistry  
Ph.D. - University of Wisconsin

Thomas Keyes  
Professor  
Theoretical Physical Chemistry  
Ph.D. - University of California - Los Angeles

Richard Laursen  
Professor  
Bioorganic Chemistry  
Ph.D. - University of California - Berkeley

Jonathan Lee  
Assistant Professor  
Biophysical Chemistry  
Ph.D. - Ohio State University

Scott Mohr  
Associate Professor  
Biophysical Chemistry  
Ph.D. - Harvard University

Amy Mullin  
Associate Professor and Associate Chair  
Physical Chemistry  
Ph.D. - University of Colorado - Boulder

James Panek  
Professor  
Synthetic Organic Chemistry  
Ph.D. - University of Kansas

John Porco  
Assistant Professor  
Synthetic Organic Chemistry  
Ph.D. - Harvard University

Alfred Prock  
Professor  
Physical Chemistry  
Ph.D. - Johns Hopkins University

Scott Schaus  
Assistant Professor  
Organic Chemistry  
Ph.D. – Harvard University

John Snyder  
Professor and Associate Chair  
Organic Chemistry/Natural Products  
Ph.D. - University of Chicago

John Straub  
Professor and Associate Chair  
Theoretical Biophysical Chemistry  
Ph.D. - Columbia University

Thomas Tullius  
Professor and Chair  
Inorganic and Bioinorganic Chemistry  
Ph.D. - Stanford University

Georgia Weinstein  
Adjunct Assistant Professor  
Coordinator, Organic Chemistry  
Ph.D. - Massachusetts Institute of Technology

Lawrence Ziegler  
Professor  
Physical Chemistry  
Ph.D. - Cornell University
Rules Governing Written Qualifying Examinations

Goals of the Written Qualifying Examinations. By the end of the second year of study, a chemistry graduate student must have passed four written qualifying examinations. These examinations determine whether the student has a satisfactory understanding of the fundamental aspects of chemistry and is prepared to pursue independent research. They establish levels of knowledge and capability through:

Questions relating to the basic concepts of a particular field. These questions draw on a variety of sources, including material covered in graduate courses. For example, the response may require a discussion of the mechanistic possibilities for a given reaction or deriving and relating important equations from physical chemistry.

Analysis of a published research article. Using information from a recent article, students may be asked to interpret the results or evaluate the conclusions of the author(s). This type of question requires a broad knowledge of the current scientific literature.

Designing a procedure for synthesis or analysis. Students may be asked to devise a route for synthesis of a given compound or to describe methods for characterizing a compound. This type of question requires a thorough understanding of chemical methodologies and the ability to apply them creatively to new problems.

Questions relating to topics discussed by speakers at the Departmental colloquia and seminars. Successful response to this type of question requires that students attend the various seminars/colloquia, as well as comprehend the material presented by the various presenters.

The written qualifying examinations are intended to determine that a student has the attributes of an independent researcher, including mastery of graduate-level course work, ability to reason independently, and proficiency in keeping abreast of published research. The examinations are designed to encourage students to commit to a continual program of learning through courses, research, reading, and attendance at seminars.

Timeframe. During the first two years of the graduate program, a student may take as many written qualifying examinations as are offered. However, the student must have passed a total of four examinations by the end of the second academic year. Students may begin to take the examinations at any time during the first academic year but no later than February. For students who start the graduate program in September, the examination sequence must be completed by May of the second academic year. For students who start the graduate program in January, the sequence must be started by May of the first year and completed by August of the second year.

Administration. The written qualifying examinations are held in SCI 294 on the third Saturday of each month. There are two, one-hour examinations in different subdisciplines offered at each seating. The first starts at 10 a.m. and the second at 11 a.m. On Friday of the week preceding the examination (i.e., eight days before), the names of the faculty submitting questions and the subjects to be covered are posted on the graduate bulletin board (located on the second floor, outside the Chemistry Office). The administering faculty proctor the examinations. All students taking the examination must sign an attendance sheet. Students are allowed one hour to complete an examination. The examinations are distributed at the beginning of each hour (10 a.m. and 11 a.m.). A student who wishes to take only one examination may arrive at the beginning of the hour of the specific examination. Students are welcome to take both examinations, but they must begin each examination on the hour and are not allowed to start an exam more than ten minutes after the hour. All students must abide by the rules of proper academic conduct during the examinations.

Examination Results. The examinations are graded on a PASS/FAIL basis by the faculty setting the questions. The results (passes only) are posted within two weeks of the examination. At the discretion of the faculty giving the particular examination, model answers to the questions may also be posted.
Rules Governing Oral Qualifying Examinations

The Oral Qualifying Examination determines a chemistry graduate student’s ability to define his or her dissertation research project and to develop a feasible research plan that can be carried out in a period of four to six years. A student may, but is not required to, present preliminary results to support the feasibility of the proposed research plan. The examination consists of a written proposal, an oral presentation, and defense of the proposal before a committee.

Written Proposal. Each written proposal should be between seven to ten pages long and have the following:

- Background and significance of the proposed research
- Discussion of methodology
- Clearly stated hypothesis(es) or objective(s)
- Project time line
- Research Plan
- Complete bibliography

The student should present a brief and accurate review of the literature in the field of the proposed research. The literature review should provide an appropriate context to support the soundness and relevance of the proposed hypothesis(es). The student should define a series of experiments, computations, or a clear program of theoretical development focused on testing the proposed hypothesis(es). The proposed research will be based on the planned dissertation research project.

In developing the research proposals, students are encouraged to meet with their Research Advisors, members of their Dissertation Advisory Committee, and other faculty to discuss and develop their ideas. Students should be familiar with the rules governing proper academic writing, oral presentation, and the many definitions of plagiarism defined in the University's Academic Conduct Code (http://www.cs.bu.edu/ugradprogram/conduct.html). The text and graphics presented should be the student's own work. If the text or graphics is derived from other investigators (including the student's Research Advisor), the material must be clearly attributed to the original author. The written proposal must be submitted to the members of the committee at least one week in advance of the examination.

Oral Defense Committee. The committee, which must have at least three voting members, will be the Dissertation Advisory Committee, with additional members added as needed. One member is designated the Chair of the committee. The Chair oversees the oral examination and drafts the committee’s final report. The Research Advisor must attend the examination but remain silent and speaks only when called on by the Chair. As the proposed research is the planned dissertation research project, the committee has high expectations regarding the student's familiarity with the subject.

Oral Presentation. The student should make a concise presentation of the proposed research. It should be no more than twenty minutes. The student should assume that the examiners are familiar with the content of the written proposal. The committee is free to ask questions during the presentation that serve to clarify the oral remarks. Questions of a more probing nature are posed following the oral presentation. These questions may be related to the oral presentation, the written proposal, or fundamental ideas underlying the proposed research.

Following the presentation and questioning, the student is asked to leave the room. The Research Advisor then summarizes the student's academic background and standing, and will be asked to comment on the student's progress in his or her research. The committee then meets in the absence of the Research Advisor to determine the outcome of the examination.

Evaluation. The committee must reach a consensus on one of four possible outcomes.

HIGH PASS, for an exemplary written proposal and oral defense

PASS, for a satisfactory written proposal and oral defense

CONDITIONAL PASS, for a mastery of fundamental ideas on which the proposed research is based, but where the written or oral presentation is inadequate. The student may be asked to rewrite the written proposal or repeat the oral defense.

FAIL, where there is a lack of comprehension of essential background material and where the written proposal and oral defense are also deficient

After the examination, the Chair meets with the student to present the committee's decision and discuss the comments on the written proposal and its oral defense. The committee’s report on the examination and the final mark become part of the student’s permanent record. Boston University Graduate School Activities Calendar for Ph.D. Degree Candidates
## Boston University Graduate School
### Activities Calendar for Ph.D. Degree Candidates

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
<th>Required</th>
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<tr>
<td>New student orientation</td>
<td>August (last week)</td>
<td>1st year students</td>
</tr>
<tr>
<td>Research Saturdays</td>
<td>September/October (4 weeks)</td>
<td>1st year students</td>
</tr>
<tr>
<td>Selection of Research Advisor</td>
<td>December 15th</td>
<td>1st year students</td>
</tr>
<tr>
<td>CH801 “Research Methods” course</td>
<td>Fall semester</td>
<td>1st year students</td>
</tr>
<tr>
<td>Creation of DAC</td>
<td>October 15th</td>
<td>2nd year students</td>
</tr>
<tr>
<td>Oral qualifying exam abstract</td>
<td>December 1st (September 1st)</td>
<td>2nd year students</td>
</tr>
<tr>
<td>Schedule Oral qualifying exam</td>
<td>February 1st (November 1st)</td>
<td>2nd year students</td>
</tr>
<tr>
<td>Complete Oral qualifying exam</td>
<td>March 15th (December 15th)</td>
<td>2nd year students</td>
</tr>
<tr>
<td>Written qualifying exam</td>
<td>Before May 31st (August 31st)</td>
<td>2nd year students</td>
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<tr>
<td>Progress reports for DAC*</td>
<td>May 31st</td>
<td>3rd year and senior</td>
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<tr>
<td>Meeting with DAC</td>
<td>June 30th</td>
<td>3rd year and senior</td>
</tr>
<tr>
<td>Public presentation‡</td>
<td>During year</td>
<td>3rd/4th year students</td>
</tr>
<tr>
<td>Independent research proposal#</td>
<td>Optional</td>
<td>Advanced students</td>
</tr>
<tr>
<td>Language exam</td>
<td>Prior to dissertation outline</td>
<td>Advanced students</td>
</tr>
<tr>
<td>Dissertation outline</td>
<td>Prior to dissertation defense</td>
<td>Advanced students</td>
</tr>
<tr>
<td>Dissertation defense</td>
<td>Any time of year</td>
<td>Advanced students</td>
</tr>
</tbody>
</table>

* Students in their 3rd year and beyond are required to submit a two to three page report on the status of their doctoral research project. That report is due each year until graduation.

‡ The public presentation must be made at least six months prior to the dissertation defense.

# Optional requirement for graduation with "honors" of Lichten Award for Excellence in Graduate Research.
Abbreviations and Acronyms

BUYCC  Boston University Young Chemists Committee  
(http://people.bu.edu.buycc)

CAS  College of Arts and Sciences  
(http://www.bu.edu/cas)

CELOP  Center for English Language Orientation Programs  
http://www.bu.edu/celop/

CMLD  Center for Chemical Methodology and Library Development at Boston University  
http://www.bu.edu/cmld

DAC  Dissertation Advisory Committee

DGS  Director of Graduate Studies (currently John Straub, the Associate Chair for Graduate Affairs, straub@chem.bu.edu)

GAC  Graduate Affairs Committee (currently headed by Amy Mullin, Associate Chair for Graduate Admissions – mullin@chem.bu.edu and John Straub, DGS)

GRS  Graduate School of Boston University  (http://www.bu.edu/cas/graduate/)

LSE  Designation for the Life Sciences and Engineering Building currently being constructed on Cummingston Street and expected to be completed in June, 2005

RA  Research Assistant

SCI  Designation for the Metcalf Center for Science and Engineering

TF  Teaching Fellow

Making Suggestions for the Handbook

We welcome suggestions for making the Handbook as useful, complete, and accurate as possible. If you discover any errors, or if you think something relevant should be added in future editions, please inform: kcsigi@chem.bu.edu.