

Carnegie Mellon University
Chemistry

Guide to Graduate Studies

For Incoming Students Fall 2017

Requirements approved November 2016

Welcome to Graduate Studies in the Department of Chemistry

Excellence in graduate training is central to the research and teaching missions of our department. The success of our Ph.D. students is of paramount importance to us. This handbook, also online at www.chem.cmu.edu/grad/guide/ along with supplementary materials, is intended to provide a clear guide to the steps leading to the Ph.D. The majority of this handbook is specific to your academic experience in the Department of Chemistry. **All Ph.D. students are responsible for familiarity with the requirements that are in place when they enter the program and should retain this handbook as an important reference.** Information about additional university resources such as The WORD (Carnegie Mellon's student handbook), the Office of the Assistant Vice Provost for Graduate Education, the Office of the Dean of Student Affairs and others are included in Appendix A of this handbook. **Be sure to review your requirements at the beginning of each semester.**

Our Ph.D. program emphasizes research training and productivity, original and creative thinking, and the development of excellent communication skills to support a successful scientific career. The handbook describes:

- orientation information to help first-year students get settled and off to a quick start,
- formal requirements for the Ph.D. Degree in Chemistry, as well as the M.S. available to current students,
- annual review procedures designed to promote steady, timely progress toward the degree, and
- policies related to academic integrity, research conduct, finances, time off and other student concerns.

All of the requirements in this handbook apply to students entering the program beginning in Fall 2017. Since some requirements differ from those that apply to students entering in previous semesters, new students should always check their own handbook to confirm requirements and inquire with us about any questions.

Note that students must complete the academic program requirements in place when they enter unless they elect newer ones in writing. When requirements are changed, it is because the department believes the new rules offer an improvement; any such changes will be discussed at a meeting with the graduate students. However, students currently enrolled whose degree program is affected by a change in requirement may choose to be governed by the older requirement that was in place at the time of their matriculation. In case degree requirements are changed and certain courses are no longer offered, the department will try to find some compromise that allows those students to satisfy the original requirements.

Procedures such as those on program oversight, policies on financial matters and others on pages 47–59 that are not part of your degree requirements may be updated during a student's graduate studies (e.g. based on budgetary or other constraints) and the new departmental policies will apply to all current students at that time. **Selected university policies are also incorporated in this handbook. Please be aware that, in the case of a conflict, university policy supersedes departmental policy.**

Feel free to discuss additional questions with us or Valerie Bridge at any time.

Graduate Program Committee

Bruce Armitage (Co-Chair), Kevin Noonan (Co-Chair), Marcel Bruchez, Rea Freeland, Tomek Kowalewski, Ryan Sullivan

Requirements last revised November 2016.

Table of Contents

Statement of Assurance	4
Carnegie Mellon Code	4
Degrees Offered	5
University Policies and Expectations	7
Academic and Research Policies	8
Getting Oriented	11
Logistics	11
Key Contacts	12
Committees and Support Related to Graduate Life and Academic Affairs	14
Resources for Teaching, Communication, Outreach Entrepreneurship, and Other Career and Professional Development	15
Laboratory Safety	17
Introduction to Facilities and Resources	18
University Student Services	20
Timeline for Completion of Ph.D. Requirements	21
Ph.D. Requirements	22
Attainment Examinations <i>(by the end of the third semester)</i>	22
Courses <i>(by end of fourth semester)</i>	23
Graduate Teaching	25
English Language Proficiency <i>(by beginning of third semester)</i>	29
Research Advisors <i>(by middle of second semester)</i>	30
Advisory Committees <i>(by third semester)</i>	31
Literature Seminar <i>(by third semester)</i>	32
Research Progress Report and Candidacy Exam <i>(by fourth semester)</i>	33
Original Research Proposal <i>(by sixth semester)</i>	37
Advancement to Candidacy and All-But Dissertation Status	42
Dissertation Progress Meetings <i>(each fall for ABD students)</i>	43
Residency	43
Doctoral Dissertation and Public Defense	43
M.S. Requirements	45

Evaluation of Student Standing and Progress Toward Ph.D.	47
Role of the Graduate Program Committee	47
Annual Reviews	47
Petitions for Extension	48
Academic Actions and Appeals	49
Additional Department, College and University Policies/Protocols	52
Assistance for Individuals with Disabilities	52
Safeguarding Educational Equity, Policy Against Sexual Harassment and Sexual Assault	52
Carnegie Mellon University Student Health Insurance Policy	52
Maternity Accommodation Protocol	52
Enrollment and Degree Verification	53
Carnegie Mellon University Doctoral Student Status Policy	53
Summary of Graduate Student Appeal and Grievance Procedures	53
Policies on Time Off, Leaves, and Withdrawals	53
Computing	54
New Policies/"Grandfather" Policy	54
Financial Matters	55
Sources of Financial Support	55
Time Limit on TA Support	56
Student Health Insurance Policy Responsibilities	56
Tax Implications of Stipend Support	56
Summer Funding	56
Policies on Outside Employment	56
Written Notice of Changes in Financial Support	57
Additional Fellowships	57
Attendance at Conferences	57
GuSH Research Funding	57
Emergency Student Loans	58
Resources for Exceptional or Challenging Situations	59
Graduate Ombudsperson	59
Procedures for Changing Advisors	59
Appendix A. Highlighted Resources for Graduate Students	60

Statement of Assurance

Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Furthermore, Carnegie Mellon University does not discriminate and is required not to discriminate in violation of federal, state, or local laws or executive orders.

Inquiries concerning the application of and compliance with this statement should be directed to the university ombudsman, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-1018.

Obtain general information about Carnegie Mellon University by calling 412-268-2000.

The Statement of Assurance can also be found on-line at:

www.cmu.edu/policies/administrative-and-governance/statement-of-assurance.html

The Carnegie Mellon Code

Students at Carnegie Mellon, because they are members of an academic community dedicated to the achievement of excellence, are expected to meet the highest standards of personal, ethical and moral conduct possible. These standards require personal integrity, a commitment to honesty without compromise, as well as truth without equivocation and a willingness to place the good of the community above the good of the self. Obligations once undertaken must be met, commitments kept.

As members of the Carnegie Mellon community, individuals are expected to uphold the standards of the community in addition to holding others accountable for said standards. It is rare that the life of a student in an academic community can be so private that it will not affect the community as a whole or that the above standards do not apply.

The discovery, advancement and communication of knowledge are not possible without a commitment to these standards. Creativity cannot exist without acknowledgment of the creativity of others. New knowledge cannot be developed without credit for prior knowledge. Without the ability to trust that these principles will be observed, an academic community cannot exist. The commitment of its faculty, staff and students to these standards contributes to the high respect in which the Carnegie Mellon degree is held. Students must not destroy that respect by their failure to meet these standards. Students who cannot meet them should voluntarily withdraw from the University.

The Carnegie Mellon Code can also be found on-line at:

www.cmu.edu/student-affairs/theword/code.html

Degrees Offered

Ph.D. in Chemistry

Students are admitted and supported on stipend for the purpose of full-time work toward completion of the Ph.D. in Chemistry. The department normally expects degree completion in 4.5–5.5 years, with monitoring of the student's timely progress via advisory committee meetings and an annual review by the Graduate Program Committee. Should extraordinary circumstances affect a student's ability to work full-time on the Ph.D., he/she should consult with the departmental graduate ombudsperson (Rea Freeland) to discuss available options for continuing work on the degree and, if already at ABD status, review Carnegie Mellon's Doctoral Student Status Policy (www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html) for additional details.

M.S. in Chemistry

Occasionally, students wish to earn the M.S. in Chemistry in parallel to the Ph.D, which is typically possible in 3–4 semesters with courses for the Ph.D. also counting for the M.S. degree plus additional units from coursework and/or evidence of substantive research accomplishment (see detailed requirements, page 45). Note that the Department of Chemistry does not admit students solely for the purpose of pursuing the M.S. in Chemistry and financial support is not available for M.S. students. Rarely, a student may leave graduate studies because he/she is unable to complete the Ph.D. for academic or personal reasons. When possible, the department works with the student to facilitate completion of the M.S. in these cases, although he/she will be responsible for remaining tuition and fees if a terminal semester as an M.S. student is required to complete the degree. Students interested in the M.S. are advised to pursue sufficient coursework in the first 3–4 semesters and to consult Dr. Rea Freeland about requirements.

M.S. in Polymer Science

Within the general requirements of the Master of Science in Chemistry, the Master of Science in Polymer Science provides the basic background for scientists and engineers to pursue technical careers in industries that manufacture, process and use polymeric materials. In consultation with an advisory committee, the student will arrange a course of studies designed to fit his or her background and career goals. Of the total 96 units, 36–48 units will be required in basic science. Courses counted toward the M.S. in Polymer Science can also count toward the Ph.D. in Chemistry, but not toward the M.S. in Chemistry or M.S. in Colloids, Polymers and Surfaces degree. Students without prior research experience are encouraged to undertake a research project in collaboration with a faculty supervisor.

M.S. in Colloids, Polymers and Surfaces

The Interdisciplinary M.S. in Colloids, Polymers and Surfaces (CPS) degree is a joint program with Chemical Engineering designed for professionals working in the polymer field. Participating faculty include Andrew Gellman, Tomek Kowalewski, Kris Matyjaszewski, Gary D. Patterson, Lynn Walker and Newell Washburn. Primary administration of the program is handled through the Department of Chemical Engineering and students are advised by Professor Annette Jacobson, Director of the CPS Program. Course work for the M.S. in Colloids, Polymers and Surfaces can also count toward the Ph.D. in Chemistry, but not also toward the M.S. in Chemistry or the M.S. in Polymer Science.

The program is open to students with a bachelor's degree in science or engineering. Courses are arranged to permit a part-time student to complete the degree work in two years by attending late afternoon and evening classes and by working on a research project during the summer.

University Policies and Expectations

It is the responsibility of each member of the Carnegie Mellon community to be familiar with university policies and guidelines. In addition to this departmental graduate student handbook the following resources are available to assist you in understanding community expectations:

- The WORD/Student Handbook: www.cmu.edu/student-affairs/theword/
- Academic Integrity Website: www.cmu.edu/academic-integrity
- University Policies Website: www.cmu.edu/policies/
- Graduate Education Website: www.cmu.edu/graduate/policies/

A University Policy is a rule that has been officially sanctioned by the president of Carnegie Mellon University and senior university leadership, and that generally has university-wide applicability. Several key policies are integrated into this handbook in the context of the related departmental Ph.D. requirements or departmental policies. Links to policies especially relevant to graduate students are at www.cmu.edu/graduate/policies/. A complete list of university policies is at www.cmu.edu/policies/. The Mellon College of Science also has a small number of policies governing graduate students, particularly related to graduate student time off and membership of dissertation committees, and these are incorporated in this handbook.

Please see **Additional Department and University Policies and Protocols (p. 52)** for key policies and protocols and **Appendix A (p. 60)** for additional information about The WORD and University resources.

Academic and Research Policies

Academic Integrity

The Department of Chemistry requires all graduate students to maintain the highest standards of academic integrity as described in Carnegie Mellon's Policy on Academic Integrity. Graduate education and research require building upon the ideas and findings of others to create reliable new knowledge, so giving appropriate credit for other's work is critical for any student or researcher. When done well, appropriate citations facilitate progress in science by directing readers to highly relevant, related work as described in the ACS Style Guide. If done poorly, a published work may contain plagiarized elements that would lead to retraction of the article, which in turn can negatively impact all coauthor's reputations and careers. As a graduate student, you need to meet the university's and the chemical profession's standards and take on this professional responsibility.

Graduate students are expected to learn the university standards during Orientation (e.g. by reading the related university policies, participating in TA training), to be familiar with the standards in the ACS Style Guide, and to continue to ask questions of their instructors and advisors if they have doubts about how to handle a specific situation. The burden is on the student to ensure special care is taken to avoid even the suspicion of an infraction. Please review the University expectations at www.cmu.edu/academic-integrity/ and the Policy on Academic Integrity at www.cmu.edu/policies/student-and-student-life/academic-integrity.html.

Departmental procedures. Suspected violations of academic integrity by graduate students will be handled following the Academic Disciplinary Actions Overview for Graduate Students. Generally, the faculty member who discovers a suspected violation determines the penalty at the initial review and action level, **in consultation with the GPC Co-Chairs and/or department head**. The consultation should include:

- a. discussion of penalties under consideration,
- b. the nature of the suspected violations, and
- c. the nature of the evidence of those violations.

The department head has the option to appoint an ad hoc committee which will convene a departmental disciplinary hearing to hear from the involved parties, review the matter, and recommend to the department head a penalty where warranted. Upon the final decision, the student will be informed in writing immediately of the decision, the basis for this decision and (when applicable) the penalty imposed, along with information about their right to appeal. The letter outlining the decision will be directed to those indicated in the Academic Disciplinary Actions Overview for Graduate Students: www.cmu.edu/academic-integrity/documents/academic-disciplinary-actions-overview-for-graduate-students.2013.pdf.

Consequences. Below are examples of academic integrity infractions and potential penalties. The penalties listed are examples of the range, not a comprehensive list, and the severity of the penalties may vary depending on whether there are any mitigating factors in a specific situation:

- Using text, tables, or figures directly from a published source (print or online) without proper citation is plagiarism. Note that both identical text and minor paraphrasing are considered plagiarism. Potential penalties for plagiarism include, but are not limited to, failure in a course or program requirement, immediate termination from a research group (without 3 months probation), disclosure of the infraction to the prospective advisor(s) if eligible to join or change groups, and potentially termination from the graduate program without the opportunity to change groups.
- Collaboration on an assignment or borrowing a classmate's or a colleague's data for a course assignment without

explicit permission of the instructor is an infraction that could lead to failure of the assignment or failure of the course (grade of R) without the opportunity to repeat the course.

- Providing unfair advantage as a TA, e.g. by sharing exam questions or answers in advance with one or more students, may warrant termination of a TA assignment, ineligibility for future TA assignments and possible suspension or termination from the Ph.D. program.

Departmental appeals process. A student may appeal an academic integrity penalty in writing to the department head within 7 (calendar) days of receiving a written decision and penalty for an academic integrity infraction. The department head may refer the matter to a small ad hoc committee for review or decide to review the evidence himself/herself, hear from the involved parties, and determine whether the penalty was appropriate or should be altered. Every effort will be made to resolve the appeal within 30 days, or as soon thereafter as is practical. Further appeals will be handled according to the Academic Disciplinary Actions Overview for Graduate Students: www.cmu.edu/academic-integrity/documents/academic-disciplinary-actions-overview-for-graduate-students.2013.pdf.

Responsible Conduct of Research

Responsible Conduct of Research (RCR) training is mandated by both NSF and NIH for research scientists, postdocs, research staff, graduate students and undergraduates funded on their grants. Per NIH's definition, "responsible conduct of research is defined as the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research." Carnegie Mellon has in place plans to meet these requirements which are described here: www.cmu.edu/research-compliance/responsible-conduct/training.html

The department has determined that both to give valuable preparation for a research career and to simplify administration of this mandate, **all graduate students are required to participate in the RCR training according to the deadlines below. You are responsible for providing a copy of the certificate of completion to Sara Wainer who will maintain departmental records of this requirement and of our compliance with NSF and NIH mandates.**

This training is important for maintaining eligibility for grant support, including in the first summer in residence and beyond, and as part of developing your broad research skills. **You are responsible for fitting this into your schedule without reminders from the department and completion will be required as part of your completion of Introduction to Research.**

All new Chemistry graduate students, regardless of the type of financial support that they currently receive (including TAs) are required to complete the online training for physical science from CITI **by mid-semester of the first semester in residence.** The course will take a few hours to complete (it may be done over multiple sessions) and the instructions for registering are under "CITI On-line RCR Education" on this page: www.cmu.edu/research-compliance/responsible-conduct/training.html

In some cases, an advisor may require a combination of online training and in-person training. Students with current or anticipated NIH support should contact their advisor about whether they need to attend the RCR Seminars or can just complete the online training to meet the departmental requirement. CMU offers an RCR Seminar Series to satisfy the NIH requirement of 8 in-person contact hours to be completed as soon as possible. Registration is required for the RCR Seminars that will involve both lecture and discussion.

RESOURCES AND REGULATIONS GOVERNING RESEARCH AT CARNEGIE MELLON

Office of Sponsored Research

www.cmu.edu/osp/

Office of Research Integrity & Compliance

www.cmu.edu/research-compliance/

Intellectual Property Policy

www.cmu.edu/policies/documents/IntellProp.html

The policy reflects the following goals:

- To create a university environment that encourages the generation of new knowledge by faculty, staff, and students.
- To facilitate wide transfer of useful inventions and writings to society.
- To motivate the development and dissemination of intellectual property by providing appropriate financial rewards to creators and the university, and administrative assistance to creators.
- To ensure that the financial return from the development of intellectual property does not distort decisions and operations of the university in a manner contrary to the mission of the university.

Policy on Restricted Research

www.cmu.edu/policies/research/restricted-research.html

Getting Oriented

Logistics

Department of Chemistry Main Office Location: Mellon Institute, Room 408

Department of Chemistry Graduate Program Office Location: Mellon Institute, Room 404

Department of Chemistry Undergraduate Program Office Location: Doherty Hall, Room 1317

Departmental Directory: www.chem.cmu.edu/about/dir.html

Departmental Event Calendar: www.chem.cmu.edu/about/calendar.html

Mailing Address: Department of Chemistry, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh, PA 15213

Phone Numbers: (412) 268-1062 for general concerns, e.g. departmental seminars and events; (412) 286-3150 for graduate student issues; (412) 268-2340 for teaching-related questions

Department of Chemistry Faculty: Current faculty, including affiliated faculty whose primary appointment is in another CMU department but who have a courtesy appointment in Chemistry, can be found online:

www.chem.cmu.edu/faculty/

ID Cards: You can get your Carnegie Mellon photo ID card at the HUB. Your card will also give you access to Mellon Institute (MI) and the MI library after 5:00 PM. These ID cards have additional features, including the ability to submit your ID photo online. For more information: www.cmu.edu/idplus/

Keys: Students typically receive a key to an office/laboratory when they are assigned a temporary desk or join a group when the faculty member agrees. It is the student's responsibility to return that key in person to Sara Wainer when they either leave that group or graduate. Office keys will also open the Copy Room (MI 400).

Phones: Most Carnegie Mellon phone numbers begin with 268. When you are on campus, you dial simply 8 and the last four numbers. For off campus calls, dial 9+1 and the ten-digit number. Long distance calls are billed to you individually.

Parking and Transportation: If you want to purchase a parking permit (prices vary according to location), you need to contact the Parking Office immediately (x8-2052) since student spaces may run out. The university has an arrangement with the Pittsburgh bus system so that you can ride free in a large region with your Carnegie Mellon ID, www.cmu.edu/parking/options/. Students interested in the special program for evening and weekend parking nearby should contact Rea Freeland about free access to Dithridge Garage after 5 PM and on weekends. Note that this special program is under review by the university and may not continue.

Computer Accounts and Email: You should already have a computer account on the "Andrew" system when you arrive. More information is at: www.cmu.edu/computing/email/google/. You may want or need to have multiple accounts but we strongly recommend that you use your Andrew email account when communicating with CMU faculty and staff. You should plan to **check your email at least twice a day. The majority of important announcements and requirements will be sent to you only by email.**

Department Calendar: The department maintains an [online calendar](#) for departmental seminars, Ph.D. defenses, and other student presentations that are part of the Ph.D. program. We will also post major Ph.D. program deadlines to this calendar; a detailed calendar of deadlines will be sent by email and available on the graduate program requirements web page.

Mailboxes and Mailroom: The Mellon Institute mailroom is on the third floor near the freight elevator. You have been assigned a mailbox, typically shared with several other students. You should plan to check your physical mailbox at least 2–3 times per week. Jack Thorpe (x8-3170) manages the MI mailroom if you have questions.

Temporary desk and computing: You will be assigned a temporary desk in a lab where you will be able to work and get to know other students until you join a group. Until you have a temporary desk assignment (typically assigned on Friday of the first week of Orientation), your main access to computing will be through your own device on the university's wireless network or the computers in the Mellon Institute Library.

Photocopiers and Fax: The department's photocopier/scanner/fax machine is located in MI 400. There is a Quick Guide on the shelf next to the machine that explains how to use the basic functions. If you are making copies, you will need to enter your research group's access code which can be found on the first page of the Quick Guide. If you are receiving a fax, the number is (412) 268-1061. You can sign out journals from the MI Library for very brief periods (2 hours) to make copies. Teaching assistants will typically be responsible for course-related copying and should use the copier in the Doherty Hall undergraduate office for this purpose.

Key Contacts in the University, College and Department

Suzanne Laurich-McIntyre, Assistant Vice Provost for Graduate Education (AVPGE)
x8-7307, suzannel@andrew.cmu.edu

The AVPGE is responsible for support programs for graduate students including travel grants, small research grants, professional development seminars, and events designed for women and students of color. She also serves as the university graduate ombudperson (see p. 14).

Rebecca Doerge, Dean, Mellon College of Science and Professor of Statistics and Biological Sciences
x8-8156, mcsdean@andrew.cmu.edu

Leading academic officer in the Mellon College of Science (www.cmu.edu/mcs/). Advocates for the college within the university and beyond. Reviews grievances that cannot be resolved within the department.

Curtis A. Meyer, Associate Dean for Faculty and Graduate Affairs, Professor of Physics
x8-2745 (Physics Office), x8-3090 (Doherty Hall Office), curtis.meyer@cmu.edu

Handles college-wide policy issues affecting graduate students. Convenes the MCS Graduate Student Advisory Council for input from students and to promote cross-college interactions among graduate students.

Linda Peteanu, Professor and Department Head
Mellon Institute 825C, x8-1327, peteanu@andrew.cmu.edu

Responsible for the overall leadership and administration of the department. For appointments, contact Brenda Chambers x8-1062.

Rea Freeland, Associate Head and Graduate Ombudsperson
Mellon Institute 440B, x8-7981, rf51@andrew.cmu.edu

Works with the department head on the overall administration of the department. Works with students and advisors

to facilitate timely progress from ABD status to the Ph.D. and coordinates with the GPC and others on general graduate student affairs and policies, including fellowships. Oversees graduate recruiting. Also serves as ombudsperson for graduate students in Chemistry regarding difficult or sensitive academic or personal situations (see p. 61).

Bruce Armitage, Professor and Graduate Program Committee Co-Chair

Mellon Institute 722, x8-4196, army@cmu.edu

and

Kevin Noonan, Associate Professor and Graduate Program Committee Co-Chair

Mellon Institute 849, x8-2138, noonan@andrew.cmu.edu

Co-lead Graduate Program Committee activities for orientation, annual review of graduate students, review of student petitions, and discussions of changes in Ph.D. requirements.

Karen Stump, Director of Undergraduate Studies and Laboratories; Teaching Professor

Doherty Hall 1316, x8-2340, ks01@andrew.cmu.edu

Advises undergraduate students and oversees the undergraduate teaching curriculum. Responsible for the operation of the undergraduate laboratories and oversees the laboratory staff. Works closely with graduate students as Teaching Assistants by making TA assignments, providing training and overall supervision. She is also one of the advisors available to a student with questions about sexual harassment.

Valerie Bridge, Senior Graduate Program Coordinator

Mellon Institute 404, x8-3150, vb0g@andrew.cmu.edu

Administration of graduate studies, including registration, enrollment, monitoring program requirements, degree certification, etc. Coordinates graduate student recruitment efforts. First point of contact for many questions.

Brenda Chambers, Administrative Associate

Mellon Institute 412, x8-1062, brendac@andrew.cmu.edu

Coordinates key departmental activities such as faculty searches and reviews, as well as department social events.

Patsey Haddock, Financial Assistant

Mellon Institute, Room 509B, x8-1064, pw17@andrew.cmu.edu

Responsible for purchase orders, petty cash, work orders for building repairs, and property management.

Seth Miller, Principal Programmer/System Administrator

Mellon Institute 411K, x8-8255, esmiller@cmu.edu

Administers the department's computers and works with computing liaisons within each research group. Maintains helpful documentation for some common tasks at support.chem.cmu.edu/.

Tim Sager, Business Manager

Mellon Institute 440, x8-3343, ts1c@andrew.cmu.edu

Oversees the business functions of the Department, including personnel, payroll, and research contracts.

Sara Wainer, Administrative Coordinator

Mellon Institute, Room 408, x8-3272, swainer@andrew.cmu.edu

Assists with graduate program, including assistance with room reservations, and graduate recruiting. Responsible for keys, photocopier, fax, departmental directory, procurement card reconciliation, and other issues.

Georgene Wittig, Program Assistant for Undergraduate Studies

Doherty Hall 1317, x8-2318, gwittig@andrew.cmu.edu

Assists in administration of the undergraduate program. Handles scheduling undergraduate classes and reserving rooms for review sessions or office hours in Doherty.

Committees & Support Related to Graduate Life and Academic Affairs

Graduate Program Committee (GPC)

The Department's Graduate Program Committee will advise first-year students about courses, selecting an advisor, and other matters during the first year. The GPC also provides general oversight regarding the graduate program policies and procedures, including the annual review of progress for all graduate students. General questions or concerns regarding registration, grades, and program requirements should be directed to Valerie Bridge. Detailed questions and concerns you may have about your academic progress or upcoming program requirements should be directed to **Bruce Armitage** or **Kevin Noonan**. However, you should feel free to talk with any member of the committee about your questions or concerns.

Graduate Ombudsperson

Rea Freeland serves as graduate ombudsperson for Chemistry graduate students to assist with sensitive or confidential concerns and provide referrals to other resources when needed. The ombudsperson's role is described in greater detail on page 56 and at www.chem.cmu.edu/groups/freeland/advise.html. Generally, students are welcome and strongly encouraged to discuss issues early to try to avoid them becoming more serious. Additionally, students may confer with the university graduate student ombudsman, **Suzie Laurich-McIntyre**, slaurichmcintyre@cmu.edu, on issues of process or other concerns as they navigate conflicts. Suzie Laurich-McIntyre is the Assistant Vice Provost for Graduate Education.

Chemistry Graduate Student Advisory Committee (GSAC)

The Graduate Student Advisory Committee provides input to the GPC on matters of concern to graduate students and the graduate program in general. For example, the GSAC has been involved in revisions to the graduate program requirements and in assessing the program. You can also talk with members of the GSAC to learn more about the graduate program and to share feedback about it. You can also address concerns to them and they can often help you determine how to get assistance. Membership of the committee currently includes: Logan Plath, Kedar Perkins, Ruixi Fan, Dima Kolodieznyi, Dinithi Perera, Meredith Schervish, Anthony Varni and Saborni Biswas.

Carnegie Mellon Graduate Student Assembly (GSA)

The Graduate Student Assembly (GSA) serves as student governing body for graduate students at Carnegie Mellon. In addition to university services listed here, the GSA actively works on issues to improve the quality of life for graduate students and to provide varied social activities to enhance students' experience of graduate school. Departmental happy hours and the department's graduate student lounge are funded in large part by graduate students' activities fees. Jon Willcox (jwillcox@andrew.cmu.edu) and Samaneh Mesbahi (smesbahi@andrew.cmu.edu) are the current department representatives to the GSA.

Mellon College of Science Graduate Student Advisory Committee (MCS GSAC)

Similar to the departmental GSAC above, the Mellon College of Science often has a group of graduate students (two from each department) to provide input to the Associate Dean for Faculty and Graduate Affairs. The MCS GSAC has organized past events such as the MCS Graduate Student Poster Session and panel discussions on careers in science.

The Associate Dean for Faculty and Graduate Affairs (currently Curtis Meyer, Professor of Physics) convenes this committee.

Chemistry Social Committee

Members of the Social Committee are involved in developing activities for the improvement of graduate student life in the department. April Berlyoung (aberlyou@andrew.cmu.edu) is the current chair. Members include Matt Baker, Saborni Biswas, Alex Carpenter, Chris Collins, Nisha Hasija, Lydia Jahl, Steph Mack, Samaneh Mesbahi, Meredith Schervish, and Jon Willcox.

Chemistry Summer Seminar Committee

This committee coordinates the Summer Seminar Series, where graduate students in the Chemistry Department host seminars delivered by peers. The seminars are a great opportunity to practice delivering professional seminars and serving on the organizing committee develops valuable organizational skills for organizing future professional meetings. The Summer Seminar Committee members are April Berlyoung (chair) and Dima Kolodienznyi.

Mellon FIT

Mellon FIT is a student organization that maintains a gym and hosts free weekly fitness classes in Mellon Institute. This organization is open to all members of the CMU community. Contact Alex Carpenter at mellonfit@gmail.com for additional information.

Resources for Teaching, Communication, Outreach, Entrepreneurship, and Other Career and Professional Development

Graduate students can find support and resources for development toward various career interests through the central university resources and local Pittsburgh organizations below. You are encouraged to talk with the contacts below and departmental faculty to identify good opportunities for you. Especially when the job market is competitive, employers often look for signs of your interpersonal, communication and leadership skills as well as your scientific expertise.

American Chemical Society Pittsburgh Section: The Pittsburgh ACS is a very active section with regular meetings held by the Energy and Technology committee, the Environmental Committee, and the Younger Chemists Committee. The ACS also has a strong outreach and networking program, not to mention the ACS National Meetings (largest scientific conference in the world) held twice a year. For more information, contact Matt Baker, mbaker1@andrew.cmu.edu or www.pittsburghacs.org

ACS Younger Chemist Committee (YCC): The Pittsburgh YCC organizes events to help pre-career chemists find their path and develop the network and skills they need to succeed. They also host social events and do outreach related to science and education. The YCC is a subcommittee of the American Chemical Society. For more information, contact Matt Baker, mbaker1@andrew.cmu.edu.

AVPGE Professional Development Seminar Series: Organized by the Office of the Assistant Vice Provost for Graduate Education, seminars in business, management and communications skills geared to better prepare our graduate students for successful careers in academic, corporate, public and research sectors. Interested students can learn more here: www.cmu.edu/graduate/professional-development/seminars-and-workshops/prof-dev-seminars.html.

Career and Professional Development Center: The CMU center provides resources to research companies, make connections and network with others, and apply and interview for jobs. Learn more here: www.cmu.edu/career/

DNAZone: The Center for Nucleic Acids Science and Technology (CNAST) has developed since 2009 this educational outreach program for 4th–12th grade students based on nucleic acid themes. The DNAZone program creates educational materials that can be used in teaching core concepts of chemistry, physics, biology and engineering, and illustrate how chemistry is the foundation for bio- and nanotechnology. The educational materials are used through a network of outreach programs at Carnegie Mellon (e.g. Summer Academy for Math and Science) and in CNAST faculty members' demonstrations and experiments in classrooms at two schools from the Pittsburgh Public School system. Contact: Professor Catalina Achim, dnazone@andrew.cmu.edu. www.cmu.edu/cnast/outreach-dnazone/

Eberly Center for Teaching Excellence: The Eberly Center provides seminars and individual consultations to help graduate students who wish to improve their teaching or prepare for future careers as faculty members. For students who may wish to pursue academic careers, particularly at four-year colleges or teaching-intensive universities, this is an invaluable opportunity to prepare for those positions. More resources are available at www.cmu.edu/teaching/.

Future Leaders of Science (FLOS): Future Leaders of Science, founded by chemistry graduate student Danielle Chirdon, is an outreach organization that is designed to create and foster K-12 students' interest in the sciences by displaying various science demonstrations to teach children the fundamental concepts in the sciences. Both undergraduate students and graduate students with a love of science, regardless of their level or field of expertise, are taught the demonstrations and then work together to display and explain the science behind the demonstration. Contact Michael Polen, mpolen@andrew.cmu.edu.

Global Communication Center (GCC): The GCC provides free consulting for the CMU community at all levels of study. Their trained communication consultants help CMU students, faculty, and staff convey their ideas logically, clearly, and effectively in one-on-one sessions, and classroom workshops. Whether it's written, verbal, or visual, get a second set of eyes on your project. Their expert feedback will help you write and present more effectively. Recent workshops have included topics such as "Making the Case that your Project is Novel" and "Team Communication." Details are available at www.cmu.edu/gcc.

Intercultural Communication Center (ICC): The ICC's language training and testing for non-native speakers of English at Carnegie Mellon is designed to help students achieve the robust English fluency needed for teaching in the American classroom and giving professional-quality presentations. In addition, students are strongly encouraged to take advantage of this resource even after passing the ITA test at the level required by the department in order to make their English fluency an asset in teaching, research communications, and their future careers. More details about ICC programs and policies are available at www.cmu.edu/icc/.

National Organization of Black Chemists and Chemical Engineers Pittsburgh Student Chapter: The Pittsburgh chapter of the National Organization of Black Chemists and Chemical Engineers (NOBCChE) was started in 2010, led by a CMU graduate student. The chapter includes undergraduate and graduate students, as well as postdoctoral fellows, from University of Pittsburgh, Carnegie Mellon, and Duquesne University. NOBCChE's primary goal is to increase underrepresented minority participation in science, math, engineering, and technology (STEM) disciplines. Members attend scientific seminars, regional and national conferences, chapter meetings, community outreach events for students grades K through 12, and professional development activities. The chapter also hosts social events throughout the academic year. Contact: Prof. Subha Das, srdas@andrew.cmu.edu

Provost/GSA Conference Funding: The Provost's Office and the Graduate Student Assembly provide Graduate Student Conference Funding which you can learn about here: www.cmu.edu/graduate/professional-development/conference-funding/

Sciences Teaching Club: Founded by Biological Sciences graduate students, the Teaching Club is organized by students who expect that teaching will play a role in their future. Teaching club officers organize a variety of events through the academic year, including seminars, discussion panels, workshops, and outreach opportunities that are geared towards providing first-hand teaching experience, and knowledge about teaching as well as the process of acquiring teaching-related jobs. Interested people can join their mailing list at: www.cmu.edu/bio/teaching-club/

Society of Analytical Chemists of Pittsburgh (SACP): Monthly speakers, and participation in PittCon (the largest Analytical chemistry conference in the US). Pamphlets are available at the guard desk on the 3rd floor of Mellon Institute.

Spectroscopy Society of Pittsburgh (SSP): Monthly speakers, and participation in PittCon (the largest Analytical chemistry conference in the US). Pamphlets are available at the guard desk on the 3rd floor of Mellon Institute.

Swartz Center for Entrepreneurship: The Swartz Center for Entrepreneurship, works with its partners to serve the entire CMU community to accelerate bringing research innovations and promising ideas to the global marketplace and helping all entrepreneurial students, faculty, staff and alumni tap into the "innovation ecosystem." Students interested in developing entrepreneurial skills can learn more about opportunities here: www.cmu.edu/swartz-center-for-entrepreneurship/get-involved/learn.html

Laboratory Safety

Graduate students are at the forefront for maintaining and enhancing the safety culture in the department for themselves and others. Training during orientation lays a foundation, and follow-up with advisors and EH&S about acquiring additional skills needed for specific research projects should be a normal part of maintaining safety as a priority.

Environmental Health and Safety (EH&S)

www.cmu.edu/ehs/

EH&S provides a broad range of services to the university to promote the protection of its community. Their web site includes biological, chemical and lab safety information and MSDS links as well as online training. Every graduate student needs to be aware of his/her responsibilities in handling an accident in the lab, whether in the teaching labs or in the research lab, including how to pursue medical attention when needed and how to report an accident. Be sure to find out who your group's safety liaison is and ask the advisor where/how to learn more about the specific concerns important in your research. **Your initial contact in any emergency should be Campus Police (x8-2323)** or if an incident doesn't require an immediate response, you can contact EH&S. The university does **not** recommend students calling 911; Campus Police will determine if that is needed and take care of that if appropriate.

University Lab Safety Committee

The University Laboratory Safety Committee reviews and makes recommendations on matters of laboratory safety policy and concern across departments. You can bring important safety matters to the attention of Professor Karen Stump who chairs this committee.

Chemistry Student Lab Safety Committee

Formed in 2014, a committee of graduate and undergraduate students will contribute ideas and initiatives to enhance laboratory safety and help students learn the expectations that they may find in industry after graduation. Members include Eric Gottlieb, Mike Polen, Woong Young So, Victoria Hofbauer, and Anne Arnold.

Introduction to Facilities and Resources

Center for Molecular Analysis (CMA)

The Center for Molecular Analysis provides training to faculty, graduate students and research staff in the operation of the various instruments there, including FTIR/NIR, UV/VIS/NIR, NMRs, MALDI/TOF mass spectrometer, Quadrupole field ion trap mass spectrometer, Diode Array UV-VIS, CD, and HPLC. Reservations for time on the CMA instruments can be at www.chem.cmu.edu/cma/.

Location: Mellon Institute 551

Contacts: Mark Bier, Director, CMA

Telephone: x8-3540

Roberto Gil, Director of NMR Facility (MI 302)

Telephone: x8-4313

Environmental Health & Safety (EH&S)

www.cmu.edu/ehs/

EH&S provides expert training and overall guidance in safe management of chemicals and biological agents in research and teaching labs. The department also has asked each research group to appoint a safety officer so you will have someone nearby who is familiar with the university and EPA expectations and safe lab practices particular to your group. EH&S will provide the training you need for your research; **please ask your advisor about any specialized training you may need** (e.g. biological safety, radiation).

Graduate Student Lounge

The Graduate Student Lounge serves as an informal gathering place for graduate students in the Departments of Chemistry and Biological Sciences so they can take a short break from the office/lab. The main lounge is for social interaction with a small area that can be used as an occasional workspace. The code to unlock the door is 134.

Location: MI 729 A&B

Contact: April Berlyoung

Telephone: x8-6583

Mellon Institute Gym

The MI Gym has weight lifting equipment, cardio equipment, and a yoga room. Free fitness classes are also offered in Mellon Institute on a regular basis through Mellon FIT. Please send an email to mellonfit@gmail.com to obtain a waiver that you must sign to gain access to the gym.

Location: MI 301

Contact: Alex Carpenter

Telephone: x8-2944

Mellon Institute Library

www.library.cmu.edu/about/hours/1142/general

The MI Library has an excellent collection, particularly in journal holdings.

Location: Fourth floor of Mellon Institute

Contact: Sarah Young, Liaison Librarian
Telephone: x8-3171
Email: sarahy@andrew.cmu.edu

Mellon Institute Storeroom

www.cmu.edu/mcs/mi-storeroom/

This is the shipping and receiving area for MI and also stocks chemicals, electrical supplies, and hardware.

Location: Third floor, near the rear entrance/exit.

Contact: Ray Butko

Telephone: x8-3212

Mellon Institute Post Office and Mellon Institute Copy Center

The MI Post Office handles U.S., international, and campus mail during limited hours in the morning. Copying facilities are available for use with departmental account number.

Location: Third floor, near the rear entrance/exit, by the freight elevator.

Contact: Jack Thorpe

Telephone: x8-3170

Mothers' Room

A small private room is available to new mothers inside the women's room on the 2nd floor of MI. The space is equipped with a comfortable chair and table, as well as a changing table. No key is required for access.

Location: MI 210

Undergraduate Program Office

Many instructors use this as a common location where TAs pick up student papers.

Location: Doherty Hall 1317

Contact: Georgene Wittig

Telephone: x8-2318

Undergraduate Computer Cluster

These Macs and PCs are for chemistry major use and can be a place for you to respond to email conveniently when you are in Doherty.

Location: Doherty Hall 2300

Contact: Georgene Wittig

Telephone: x8-2318

Undergraduate Laboratories

The Doherty Hall labs are the location for the laboratory courses in which many graduate students work as TAs.

Locations: 1st, 2nd, and 3rd floors, enter at Doherty Hall south entrance

Contact: Karen Stump, Teaching Professor and Director of Undergraduate Studies and Laboratories

Telephone: x8-2340

University Student Services—Quick Guide

The following brief summary of services will help you begin to get settled at Carnegie Mellon. For more detailed information regarding student services, please consult www.cmu.edu/graduate/.

Cohon University Center: The Cohon University Center (CUC) houses a large variety of facilities, including recreational areas (pool, gymnasium, fitness facilities, free exercise classes); dining options; the University Store (textbooks, clothing, gifts), and Entropy (a convenience store). www.cmu.edu/cohon-university-center/

Enrollment Services (“The Hub”): The Hub is the central location for obtaining your ID, course registration, and other enrollment services. It is located in Warner Hall, Room 28A. Please see the Enrollment Services website www.cmu.edu/hub/ for additional information such as the schedule of classes.

Housing Services: Located in Morewood Gardens E-Tower, the Housing Office (x8-2139) will furnish you with listings of rentals in the vicinity. Their web site is www.cmu.edu/housing/.

Payroll Office: Payroll is equipped to answer questions related to your paycheck (including some income tax questions) and is located at the CMUWorks Service Center at 4516 Henry St. Questions regarding your paycheck (income tax, etc.) should be directed initially to Tim Sager, Business Manager for the Chemistry Department, (x8-3343). www.cmu.edu/cmuworks/

University Health Services: Located in the first floor of Morewood Gardens E-101 (x8-2157), this office can provide information regarding health insurance and offers a variety of basic medical care. Hours of operation are available at www.cmu.edu/health-services/.

Office of International Education (OIE): The Foreign Student Advisors, on the third floor of Warner Hall, are important contacts to assist you with questions about visas. OIE also organizes the International Student Orientation held during the second week of August which international students are required to attend. You can contact them by email at oie@andrew.cmu.edu.

Office of Disability Resources: Students with disabilities are encouraged to self-identify by contacting Catherine Getchell, (412) 268-6121, getchell@cmu.edu, to access the services available at the university and initiate a request for accommodations. See additional information on page 52.

See Appendix A for additional Highlighted Resources for Graduate Students (p. 60)

Timeline for Completion of Ph.D. Requirements

This timeline shows the typically expected time to complete the Ph.D. in 4.5–5.5 years, given timely completion of these requirements along with good progress in research.

Year 1

1 st Semester	<ul style="list-style-type: none"> • Attainment examinations taken • Course work begins • ICC work toward English proficiency begins for non-native English speakers
Mid 2 nd Semester	<ul style="list-style-type: none"> • Commitment to research advisor and joining a group due by mid-semester (typically completed by early in 2nd semester)
End of 2 nd Semester	<ul style="list-style-type: none"> • TA requirement typically completed

Year 2

Beginning of 3 rd Semester	<ul style="list-style-type: none"> • English Language Proficiency requirement due • Advisory Committee formed
3 rd Semester	<ul style="list-style-type: none"> • Literature seminar due • Attainment requirement due • Four Course requirement due
4 th Semester	<ul style="list-style-type: none"> • Research progress report and Candidacy exam completed, including poster presentation, written report, and oral exam • <i>Ph.D. Candidacy typically achieved</i>

Year 3

6 th Semester	<ul style="list-style-type: none"> • Original research proposals due • <i>All-But-Dissertation Status typically achieved</i>
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Years 4–5

7 th and 9 th Semesters (or preceding summer)	<ul style="list-style-type: none"> • ABD committee meeting due, to review research progress since 4th semester, thesis outline, estimated timeline to graduation, and discuss career plans and job search
10 th –11 th Semester	<ul style="list-style-type: none"> • Completion of Ph.D. typically achieved.

Ph.D. Requirements

The vision of the Ph.D. program is to develop each student's knowledge and skill in original chemical research so that our graduates are prepared to initiate new research directions, adapt to changing business or societal priorities, and communicate research for positive impact on science and society.

Specifically, the learning objectives of the program are for students to:

- Attain background knowledge appropriate for Ph.D.-level research
- Prepare for teaching and mentoring roles in academia and industry
- Speak effectively to an audience of faculty and peers about chemistry
- Develop professional-level scientific writing skills
- Conduct extended research with increasing independence
- Generate ideas for original research in chemistry and defend the methods and importance of the research
- Make an original contribution to knowledge, and produce material worthy of publication

This section describes the formal requirements for the Ph.D. Degree in Chemistry at Carnegie Mellon as well as the review procedures designed to ensure steady progress toward that degree. It is intended to provide a clear guide to the steps leading to the Ph.D. Degree in Chemistry. The requirements for the Ph.D. degree have been formulated to aid the graduate student to develop the proficiency typically expected of a research scientist in chemistry in academia, industry or government. In the interests of both the students and the faculty, the requirements for the Ph.D. degree carry a schedule for their completion. The schedule and review procedures are intended to speed the student's progress toward Candidacy and provide consistent focus on the student's research progress. The normal time to complete the Ph.D. is 4.5–5.5 years. Extensions on Ph.D. program deadlines may be possible in exceptional circumstances according to the procedures under **Petitions for Extension** (page 48).

The Department will regularly inform students of their progress toward the degree (see Annual Reviews, page 47). ***Failure to satisfy any requirement on a timely basis is cause for a dismissal from the graduate program following the procedures outlined below under Academic Actions and Appeals (pg. 49–51).*** Note that an academic year comprises two semesters, with the summer not being construed as a semester.

In the event that the requirements are changed, students may adopt the new requirements or remain under the requirements in effect on their matriculation, at their discretion.

Attainment Examinations

The purpose of the attainment examination requirement is to ensure sufficient fundamental background for graduate course work and breadth for further research. The attainment exams assess incoming students' knowledge in core areas of chemistry frequently represented in the department's research and ensure that deficiencies are addressed through appropriate course work and/or a re-examination.

Expectations

By the end of the third semester, entering graduate students must pass an attainment requirement in each of three areas of chemistry: Organic, Inorganic, and Physical.

Students may meet this requirement by either:

- Passing an attainment examination in each area, or
- Passing graduate course work in the area, typically 12 units, as deemed appropriate by the Graduate Program

Committee with a grade of at least a B in each course.

In order to receive credit toward passing an attainment exam, a student must earn at least a B (3.0) in a full semester of GPC-approved coursework in that area (typically 12-units). For physical chemistry attainment credit based on performance in approved mini-courses (09-6xx), students must receive at least a B (3.0) in each of the physical chemistry mini-courses. Otherwise, they will need to retake and pass the physical chemistry attainment exam, or they may retake the mini-course with the lower grade or take a different GPC-approved course and earn B's in each of two mini-courses for a total of 12 units. Note that 09-603 Mathematical Analysis for Chemistry is recommended as preparation for physical chemistry graduate courses, but does not count toward the physical chemistry attainment requirement.

Normally, all students will take attainment examinations upon arrival in the department for the purpose of guiding advising on courses. Based on the results of the exam, the choice among the options above is determined by the Graduate Program Committee after consultation with the student and advisor (if one has been selected). Note that if a student does not have sufficient background to enter a graduate course in a given area, he/she will need to take (or audit) undergraduate coursework approved by the Graduate Program Committee, and then either retake and pass the attainment exam in that area or pass appropriate graduate course work by the end of the third semester in residence. Attainment requirements must be satisfied before a student may complete the research progress report requirement.

Outcomes

Students may retake the attainment exam when it is administered to new students in January and/or the following August. Failure to pass the attainment requirements by the end of the third semester will lead to probation. Failure to meet this requirement by the end of the second year in residence will lead to a delay in completing the research progress report and is grounds for termination from the program. With the agreement of the advisor, the student may petition the GPC in writing to request an extension beyond the third semester to complete the attainment requirement. (See **Petitions for Extension** page 48)

Courses

The purpose of the course requirement is for students to display mastery of their field and in-depth knowledge appropriate for conducting research.

The equivalent of at least four full-semester graduate-level lecture or laboratory courses in chemistry or closely related fields must be passed with a B or better in each course by the end of three semesters in residence, for a total of at least 45 units. Students are encouraged to take at least one course outside of their research area, which may include courses in other departments. Relevant department policies related to course work include the following:

- One relevant upper-level course (typically 500-level or higher) in another department may be considered for graduate credit; approval by the GPC for the course is required.
- Up to two graduate chemistry courses from a previous institution may be considered for transfer credit with approval from the equivalent CMU course, the student's research advisor and GPC co-chairs according to the department's policy on Transfer of Course Credit and University Policy on Grades for Transfer Courses. The grade will not be listed on the student's transcript; only the course title and units awarded will be visible.
- Students are also required to complete 09-700 Introduction to Research to become familiar with faculty and research in the department and 09-911 Graduate Seminar to develop skills in critically reading and presenting the chemistry literature. These units do not count toward the four full-semester graduate lecture and laboratory courses.
- Up to 12 units of Independent Study may be used toward the four full-semester course requirement in rare situations where important lecture or laboratory course work is not available to meet a deadline and when all

three of the following are approved by the GPC Co-Chairs, and filed with the department: (1) a syllabus or reading list; (2) clear parameters for one or more substantial required written products demonstrating the learning, proportional to the proposed number of units, and (3) a faculty supervisor with expertise in the area and willingness to answer questions, evaluates the outcomes and gives a letter grade.

Additional relevant university policies include:

- If a student repeats a course, note that the first grade will continue to appear on the student's transcript and will be counted in the GPA used for the M.S. degree. See Carnegie Mellon University Grading Policies for details: www.cmu.edu/policies/student-and-student-life/grading.html
- Courses may be taken in other departments or at the University of Pittsburgh (through cross-registration) with the approval of the Academic Advisor. The Department of Chemistry accepts the grading policy of other departments and the University of Pittsburgh for approved courses. The grade will not be listed on the student's transcript; only the course title and units awarded will be visible.

Course Advising. Students, in consultation with the GPC and their research advisors, may plan a program of courses both to fit their background and interests and to satisfy the Ph.D. requirements. While well-prepared students often take the minimum four full-semester courses, students are advised to take additional work as needed for their background, career goals, and research interests. With permission of their research advisor, interested students may be able to take or audit a course in management, teaching, or policy that may be of interest for their career paths. Note that such courses do not count as one of the four required courses in chemistry or closely related fields. For non-credit options with flexible scheduling, please see also the Professional Development Seminar Series offered through the Assistant Vice Provost for Graduate Education and programs offered through the Eberly Center for Teaching Excellence. **NOTE: Students who are interested in completing the M.S. in Chemistry need additional coursework and an overall GPA of 3.0.** They are advised to seek advice from the GPC Co-Chairs by the beginning of the 3rd semester in residence (See M.S. Requirements page 45).

Expectations and Outcomes

Two grades of C or a single grade lower than C will lead to probation and to review of the student's standing by the GPC each semester until the course work requirement is satisfied. To continue in the Ph.D. program, the student must earn a B or better in each course for enough GPC-approved courses in the subsequent semester(s) to remain on track to satisfy the course work requirement by the end of the third semester. Note that advisors are strongly encouraged to review a student's grades before accepting him/her into their research groups and low grades may lead to an advisor's negative decision.

The course requirement normally must be completed before the student is eligible to complete the research progress report oral exam and is required to advance to Ph.D. candidacy. Failure to meet the course work requirement by the end of the third semester is grounds for termination from the program. If terminated from the Ph.D. program, students who have not yet completed the M.S. degree may be eligible to transfer to the M.S. program for one semester as described under **Academic Actions and Appeals** (pages 49–51).

SEE ONLINE FOR: Transfer of Graduate Course Credit form
Independent Study Credit form
www.chem.cmu.edu/grad/guide/forms/

RELATED POLICIES ON GRADES AND COURSE TRANSFER:

University Policy on Grades

www.cmu.edu/policies/documents/Grades.html

This policy offers details concerning university grading principles for students taking courses and covers the specifics of assigning and changing grades, grading options, drop/withdrawals and course repeats. It also defines the undergraduate and graduate grading standards.

Carnegie Mellon University Policy on Grades for Transfer Courses

www.cmu.edu/policies/student-and-student-life/transfer-credit-evaluation-and-assignment.html

Carnegie Mellon University offers students the opportunity to take courses for credit through a cross-registration program and through the receipt of transfer credit from other accredited institutions. (See below for Pittsburgh Council on Higher Education .) The Carnegie Mellon University transcript will include information on such courses as follows: Carnegie Mellon courses and courses taken through the university's cross-registration program will have grades recorded on the transcript and be factored into the QPA. All other courses will be recorded on this transcript indicating where the course was taken, but without grade. Such courses will not be taken into account for academic actions, honors or QPA calculations. (Note: Suspended students may take courses elsewhere; however, they may receive transfer credit only if their college's and department's policies allow this.)

Pittsburgh Council on Higher Education (PCHE)

www.pche.org/cross-registration/

The Pittsburgh Council on Higher Education (PCHE) is a voluntary, multi-purpose consortium of the ten accredited colleges and universities in Allegheny County, Pennsylvania. Please see the details of the policy for cross-registration.

Department of Chemistry Policy on Course Transfer

Students may request transfer of credit for up to two previous graduate courses from other institutions that are equivalent to courses offered at Carnegie Mellon. The student must provide (1) a sufficient course description for such courses, (2) an official transcript showing the relevant previous courses, (3) supporting documents stating the course was not used for a previous degree, and (4) signatures from the Carnegie Mellon course instructor, his/her advisor, and the Graduate Program Committee indicating their approval. The approval form is available from the Graduate Program Coordinator. A minimum grade of B is required to transfer credit for a course. Also, courses needed to meet the requirements of a previously received degree may not be transferred.

Graduate Teaching

The purpose of this requirement is to help students prepare for teaching and mentoring roles in academia and industry and to contribute to the quality and safety of instruction in the undergraduate program. Excellent performance as a TA can be used to indicate many of the relevant skills for future positions requiring management and communication skills. Through this experience, students can hone a variety of skills relevant to many careers, including:

- explaining concepts and procedures to novices and non-experts,
- motivating why a topic is important and interesting,
- observing and giving feedback on laboratory work and safety,
- giving constructive feedback on written work,
- communicating expectations effectively, and
- managing work performed by teams.

Note that, in order to develop the widest range of these skills as a TA, non-native speakers of English must have excellent English proficiency, often Pass or Restricted I on the ITA Test, to receive TA appointments in recitation and at least Restricted II for TA appointments in laboratory. Students are also encouraged to hone many of the skills above as part of mentoring undergraduates in research and they should discuss opportunities for this with their advisors (e.g. as part of the Annual Review of Graduate Students).

Expectations

Every student must teach for two semesters as a Teaching Assistant, either as a recitation TA, laboratory TA, or a grader/course assistant. This formal academic requirement is an important part of a graduate education and must be completed to the satisfaction of the instructor for that course. In addition, if a student does not have the opportunity to be a recitation TA or laboratory TA (either due to their funding or qualifications for those TA assignments during the first 1–2 years in residence), he/she will be required to plan and complete by the end of the fourth year in residence one of the following options to further develop teaching and mentoring skills:

- **Completing the Eberly Center future faculty program**, with a transcript of the activities and copies of the projects completed,
- **Completing a mentored experience over at least one semester or summer including an average of 3–4 hours/week of work approved by the GPC and supervised by a faculty mentor.** The experiences could include, for example, mentoring an undergraduate in research, assisting with significant course revisions, assisting with exam or homework writing, holding office hours or help sessions (limited to working with students 1-1 during the sessions if Restricted II), interacting with students in lab (if Restricted II or higher), developing team or online activities for students, conducting review sessions (if Restricted I or higher), guest lecturing (if Restricted I or higher), or providing feedback on student presentations, writing or lab work. Note that this mentored experience could be documented as part of the student's role as a course assistant when the faculty instructor is willing to serve as a mentor for the types of activities above that go beyond grading.
- **A mixture of the two options above appropriate for an average of 3–4 hours/week over 15 weeks.**

In all three versions, students must submit, in consultation with the faculty mentor, a brief plan for the activities they will complete to be approved by the GPC by the first day of the semester in which the work is to be completed and a satisfactory reflective paper (2–3 pages) submitted to the faculty mentor and GPC by the last day of classes about what was accomplished and learned through the experience, attaching key products of the major activities completed. The faculty mentor should meet substantively with the student at least 3 times over the semester, including for initial planning and a mid-semester progress assessment, in order to provide guidance and feedback in accomplishing the plan. Any interested student may also consult with the GPC Co-Chairs about pursuing a similar experience.

Teaching Assistant Duties

After the two-semester requirement is completed, students may continue as a TA as part of their financial support and must continue to maintain satisfactory performance (as described under Financial Support). The details of TA assignments vary by course and students must consult with the course instructor each semester about his/her specific duties and expectations for satisfactory performance

The duties of a Teaching Assistant require approximately 15–20 hours per week. Note that TA duties are one of the primary sources of financial support and that renewal of an appointment as a TA is contingent on satisfactory performance as a Teaching Assistant. Therefore, the expectations below are important for all TAs.

Teaching assistants are expected to fulfill all of the responsibilities of their role in a timely fashion and to make appropriate arrangements with the instructor at least 1–2 weeks in advance if they anticipate any difficulties in doing so. For example, instructors need to be consulted in advance if a TA would like to arrange for someone to teach a class

for him or her. Barring unforeseen emergencies, travel arrangements must be made far enough in advance that they do not conflict with TA training and teaching responsibilities.

Training

The Department provides TA training each August specific to the roles of recitation TAs, lab TAs, and course assistants for which attendance is required for the first two semesters in which the student serves in a particular role.

Representative topics covered during TA training include:

- Chemical Safety Training and Laboratory Waste Disposal
- First Aid Training
- Academic Integrity
- Teaching a Recitation
- Microteaching (teaching a very short lesson with immediate feedback)
- Safety in the Undergraduate Chemistry Laboratory
- Teaching in the Laboratory
- Introduction to Grading
- Grading Exams And Problem Sets

Note that instructors for TA training, in addition to the Director of Undergraduate Studies and Laboratories also serve as ongoing resources when TAs have questions or concerns about their responsibilities.

Outcomes

Instructors determine the expectations for each graduate TA assignment. If a TA appears to be having difficulties meeting these expectations, instructors are expected to provide timely written feedback to let the TA know what type of changes or improvements are needed. The feedback should be sent to the TA and cc'ed to the Director of Undergraduate Studies and the GPC Co-Chairs. If a student is informed of a significant deficiency, does not address the problem adequately, and cannot document reasonable efforts to improve, that semester will not count toward the two semesters required for the doctoral degree. An additional semester as a TA or an appropriate Independent Study will be required until the graduate teaching requirement is fully satisfied. If no written feedback suggests the need for changes, the TA can interpret that as an indication of satisfactory performance.

Feedback

Recitation and laboratory TAs can typically receive early course feedback from their students to improve their performance during the semester and a formal TA evaluation at the end of the semester that can be used to document their effectiveness for job applications or in nominations for departmental, college or university teaching awards. Instructors also normally provide end-of-course evaluations for their TAs. Where applicable, progress in mentoring undergraduates in research is also assessed by advisors during the Annual Review of Graduate Students (page 47).

Further Development

Those who wish to develop specific skills through their additional TA experiences should discuss their goals with both GPC Co-Chairs and the Director of the Undergraduate Program and Laboratories so that a long-term strategy can be developed to assist them. Students who only get the opportunity for serving as a course assistant are strongly encouraged to discuss alternative opportunities for further development of these skills with one of the GPC Co-Chairs.

As part of the Annual Review of Graduate Students (page 47), students are encouraged to meet 1-1 with one of the GPC Co-Chairs if they are interested in enhancing their skills in this area. For example, students who are seeking careers involving teaching or management should proactively seek feedback on their TA performance from the

supervising instructor and the course instructor. For areas of additional experience or training, both the Director of Undergraduate Studies and Associate Department Head can advise on additional opportunities to further develop teaching skills.

RELATED POLICIES ON ENGLISH FLUENCY FOR TEACHING ASSISTANTS

Carnegie Mellon University Evaluation and Certification of English Fluency for Instructional Personnel

Graduate students are required to have a certain level of fluency in English before they can instruct in Pennsylvania, as required by the English Fluency in Higher Education Act of 1990. Through this Act, all institutions of higher education in the state are required to evaluate and certify the English fluency of all instructional personnel, including teaching assistants and interns. The full university policy can be reviewed at: www.cmu.edu/policies/faculty/evaluation-certification-english-fluency-instructors.html. The fluency of all instructional personnel will be determined by each department. See English Language Proficiency (page 29 of this handbook) for more information.

In addition to administering the International Teaching Assistant (ITA) Test (a mandatory screening test for any non-native speaker of English), the Intercultural Communication Center (ICC) helps teaching assistants who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon. Visit the ICC website for additional information: www.cmu.edu/icc/.

Department of Chemistry Responsibility in the University Policy on English Fluency for Instructors

Each graduate student with a Restricted I or Restricted II on the university's ITA Test who has a current TA assignment is required to complete the ITA Support Program concurrent with the TA assignment as described here: www.cmu.edu/icc/testing/ITA/ITAscoreing.shtml

The department is responsible for ensuring student compliance. The policy below reinforces the seriousness of this university requirement. The ICC reminds students with ITA Test scores of Restricted I and Restricted II of this requirement every semester, so forgetting or misunderstanding the requirement is not an acceptable excuse. If you have conflicts with your coursework or TA assignment, it is your responsibility to notify the department at the beginning of the semester and try to come up with a solution. You must plan your research around this ~1–2 hour/week obligation for training to improve your English. You need to begin work with the ICC at the beginning of each semester to be successful. Restricted I and Restricted II students are strongly encouraged to take advantage of the opportunities at the ICC to pursue a score of Pass, which requires no additional language training.

The following are the consequences for failing to comply with this 15 hours/semester requirement in semesters when you have a TA appointment as a Restricted I or Restricted II student:

1. If the ICC's mid-semester attendance report shows less than 50% completion (7.5 hours) toward the goal, you will receive a warning letter cc'ed to your advisor(s). Note that if you have delayed too much, it may be impossible to catch up after this date.
2. Failure to complete or very nearly complete the 15 hours of concurrent ICC work during a TA assignment will be viewed as not satisfactorily meeting the expectations for the TA assignment. That semester of teaching will not be counted toward the departmental requirement of two semesters as a TA.
3. Students in Restricted I and Restricted II who are not in compliance with this requirement will be required to make up any deficiency in their ICC work by no later than the end of the subsequent semester or summer, whether or not they are a TA at that time. For example, a student who completes 5 hours of ICC work in the fall semester would be required to complete 25 hours in the immediately following spring.

4. Advisors will be informed about any semester when a student is out of compliance. When a student is egregiously out of compliance (e.g. 5 hours or fewer of ICC work in a single semester) or when he/she has not made up the work as described above, his/her eligibility to receive a full-semester TA appointment will be in jeopardy. Additional requirements for developing English fluency may be assigned as a condition of receiving a TA appointment, if a TA appointment is possible.

English Language Proficiency

Each student for whom English is not a native language must demonstrate fluency in spoken English by the end of the first year in residence. The Intercultural Communication Center (ICC) has been established by Carnegie Mellon University to teach this skill, and administer the required fluency test. The purpose of this requirement is to ensure every student's ability to communicate effectively in English with Department members and external colleagues about their research and to enhance their ability to contribute effectively to the Department's educational programs.

Expectations

Students are generally expected to receive a Restricted II (formerly called Category 3) or better on the International Teaching Assistant Test by the beginning of the third semester in residence and to continue working toward Pass or Restricted I (formerly referred to as Category 1 or 2). Starting in the first semester in residence, the Department expects a consistent effort in working with the ICC and in speaking English regularly in departmental activities to achieve these goals in a timely manner. While the ICC may recommend different workshops for different individual needs, a student's total hours in workshops, tutoring and self-paced work at the ICC should be between 15–30 hours each semester until reaching Restricted II to be viewed as consistent effort. In addition, effort is required year-round, including 15–30 hours in the summer, until reaching Restricted II. Students are expected to take the test at the earliest opportunity recommended by the ICC and the department.

Note that all students who received Restricted I or Restricted II who are working as TAs are required by Carnegie Mellon policy and Pennsylvania law to work concurrently with the ICC to improve their English fluency, typically through the workshops and/or individual tutoring. This work at the ICC is called the ITA Support Program Requirement. (See "CMU's Evaluation and Certification of English Fluency for Instructional Personnel" p. 28)

In addition, the Department strongly encourages students to use English day-to-day in discussing their research since non-technical conversations in English often do not improve fluency on scientific topics. Advisors are also encouraged to talk directly with students when problems with English appear to interfere with communication about research and to inform the GPC as early as possible when they have concerns in this area.

Outcomes

Good standing in the department may be jeopardized if a student neglects to work sufficiently on their English fluency, based on information from the ICC. However, because the Department recognizes that language learning rates can vary substantially, the deadline of reaching Restricted II by the beginning of the third semester may be adjusted for individual students' needs as long as the student maintains appropriate, consistent efforts to improve. Failure to reach Restricted II by the beginning of the third semester may delay completion of the formal seminar requirement if the required effort at the ICC has not been made for one or more semesters or in the summer. Students are expected to make up the deficiency in hours of training as much as possible within the ICC's offerings before they can schedule the formal seminar.

Failure to make sufficient efforts in line with recommendations from the ICC and the Department may lead to probation after one semester. Students who have not reached Restricted II by the beginning of the fourth semester in residence and have not sustained consistent efforts to improve English fluency may not be allowed to complete the research progress report and are at risk for termination from the program.

SEE ONLINE FOR: ITA Test Category Descriptions
www.cmu.edu/icc/testing/ITA/ITAscoring.shtml

Research Advisors

The primary responsibility of the Research Advisor is directing the research for the dissertation, but he/she also provides guidance for meeting the other Ph.D. program requirements, general educational advice, career planning, and often job search assistance. The Research Advisor also provides formal written notice when issues in the student's research performance jeopardize continuation in the group (See **Academic Actions and Appeals**, pages 49–51).

A Research Advisor is to be selected from the Chemistry faculty by mid-semester of the second semester in residence. This involves mutual agreement between the student and the faculty member, and requires approval by the Department Head. Selecting an advisor and joining a lab/group in the first semester is encouraged when the student is confident of his/her interests. The advisor (or co-advisors), the student and the department head must agree for a student to join a group officially.

Process of Joining a Group

In general, the process of joining a group is flexible and students are responsible for actively seeking out faculty during the initial weeks of the first semester to discuss their research interests and possible openings available in the group. While every effort is made to admit students with research interests that match openings in the department's research groups, students are not admitted to particular research areas and first-year students sometimes develop new research interests that affect the distribution of openings. Flexibility in the process is intended to allow students to find a group suitable for them and for faculty to find good matches for their research groups. These are the major strategies:

- Students are required to attend Introduction to Research where faculty members speak about their research at the start of each academic year,
- Students are encouraged to meet with faculty of interest 1-1 as soon as possible, visit regular group meetings to learn more about the ongoing research and talk with others in the group; and
- Students may arrange 2–3 rotations of typically 4–6 weeks each for hands-on experience in their groups of interest, although some groups may not offer rotations,

Prior to selection of a Research Advisor, students are strongly encouraged to discuss their research interests with a minimum of three faculty members. Moreover, the students should get to know the faculty widely, get advice from students whose studies are further advanced, and visit with faculty in their offices. It must be understood that the chosen advisor will occasionally decline the relationship, either because of overload, lack of sufficient research support or lack of intellectual compatibility.

Expectations and Deadlines

A first-year student must join a research group prior to their first summer in the department in order to remain in the Ph.D. program. Students who have not secured an advisor by mid-semester of their first spring in the department are advised to consult the GPC Co-Chairs. More advanced students who lose an advisor may be eligible to change advisors (see Outcomes, below, and Eligibility to Change Advisors, page 50).

The Research Advisor becomes de facto the Academic Advisor to the student making the student aware of Ph.D. requirements in collaboration with the GPC, recommending coursework, and monitoring progress toward the Ph.D.

The Research Advisor may set his/her own requirements for good standing in the group and has the responsibility to communicate in writing any deficiencies in an advisee's research activities that are significant enough to jeopardize their continuation in the group and/or in the Ph.D. program as described under **Academic Actions and Appeals** (pages 49–51).

Outcomes

A student without a Research Advisor at any stage in the Ph.D. program typically is not eligible for financial support in the summer and will normally be required to withdraw from the Ph.D. program, with discussion of options to complete the M.S. in Chemistry, if not already completed.

While the advising relationship typically lasts the duration of a student's Ph.D. studies, either the student or the Research Advisor (or co-advisor) may terminate their relationship according to the approved departmental procedures described under Academic Actions and Appeals. A student otherwise in good standing in the department may then select a new Research Advisor on mutual agreement between the student and the faculty member, and approval by the Department Head.

Normally, for a new advisor to consider a student favorably, he/she must be in good standing and must be making timely progress on program requirements expected for their semester in the program. As described under Academic Actions, the student may request a 1–2 month grace period to search for a new advisor and will have the opportunity to be considered for a teaching assistant or other position during that time, should one be available, although financial support cannot be guaranteed. A student who is changing groups typically needs to join a new group prior to summer in order to continue in the Ph.D. program. See additional information about changing advisors (page 56).

SEE ONLINE FOR: Thesis Agreement Form
Thesis Agreement Form (Co-Advising option)
www.chem.cmu.edu/grad/guide/forms/

Advisory Committees

The primary purposes of the Advisory Committee are: (1) to evaluate the student's performance on the research progress report/candidacy exam, original research proposal, and dissertation, and (2) to discuss the student's progress and provide additional guidance on research and overall professional development. The Committee may also be called upon for input when there are questions about a student's ability to continue in the Ph.D. program.

Forming the Advisory Committee

Prior to forming advisory committees, students are encouraged to consider the types of knowledge and skill that they would like to develop and to meet with potential committee members to discuss research interests. Students are encouraged to build 1-1 relationships with their Advisory Committee members, some of who may become collaborators, additional mentors or references.

In consultation with the Graduate Program Committee and his/her advisor, a student will select a Research Advisory Committee by the beginning of the third semester in residence. This committee will comprise the membership of the examination committee for the research progress report and original research proposal. The Committee may also be called upon for input when there are questions about a student's ability to continue in the Ph.D. program. In addition, after the student reaches ABD status, the Advisory Committee will meet with the student approximately annually in Dissertation Progress Meetings to support timely completion of their Ph.D.

A typical Advisory Committee will consist of the Research Advisor(s) and two other Chemistry faculty members, normally from the Tenure Track or Research Track. When it would be advantageous for the student's research, one of these members may be from outside the department. Note that each faculty member may serve on a limited number of these Advisory Committees to ensure that he/she can provide the appropriate amount of attention to each student. Therefore, students are typically advised to have committees with three faculty members; students with co-advisors should have four members.

Note that advisory committees may need to change when a student plans his/her dissertation defense in order to conform to MCS Guidelines on Doctoral Thesis Committees which require a “visiting” member not affiliated with the department.

Advisory Committee Chair

The student will also select a Chair of the committee, different from the Research Advisor(s), whose role is to oversee and provide feedback on the oral exams for the research progress report/candidacy exam and original proposal, to provide general guidance regarding the original proposal, to help the student in preparing for dissertation progress meetings, and to provide a brief summary and written feedback to the ABD student and the GPC after dissertation progress meetings. The student may also consult with the GPC about choosing a chair.

RELATED POLICY ON DOCTORAL THESIS COMMITTEES

MCS Policy on Doctoral Thesis Committees

www.cmu.edu/mcs/fac_staff/handbook/doctoral.html

The Mellon College of Science has additional requirements for doctoral thesis committees which require the addition of a visiting member for the dissertation defense. Note that if you have an advisory committee with members from outside the Chemistry Department, you are advised to plan ahead if you wish to avoid changes in your committee to satisfy the MCS policy. Please consult with Rea Freeland when initially forming your committee.

Literature Seminar

The learning objectives of the literature seminar are to demonstrate that the student has:

- mastered a topic in the current chemistry literature sufficiently to speak effectively to a general audience of faculty and peers about it and
- read the research literature appropriately and critically to provide a synthesis with implications and/or to identify open questions in the area.

The seminar presentations also introduce all seminar participants to issues in the current chemical literature and create an environment for discussion of the literature.

Students will enroll in 09-911, Graduate Seminar, for their first four semesters, and receive non-lecture course credit for delivering their seminar and providing constructive feedback to other students on their presentations.

Expectations

The topic may be chosen by the student with the approval of the student’s advisor(s) and the course instructor. Students may choose a seminar topic to broaden his/her knowledge beyond the current project or serve as a foundation for the original proposal. Details are provided in the syllabus for 09-911. An extension to present the seminar in the fourth semester in residence may be requested by petitioning the Graduate Program Committee, explaining what makes the circumstances exceptional and proposing an alternate deadline.

The seminar must be based on published work done in other laboratories. In general, seminars should draw on many articles from the literature and represent a synthesis of ideas that goes beyond summarizing individual pieces of research. An annotated bibliography should be submitted two weeks in advance of the presentation to the course instructor and student’s advisor. Presentations are expected to be approximately 30–40 minutes in length, including approximately 10 minutes of questions and discussion with peers and faculty. Students are advised to arrange a practice talk with their advisor and others to prepare. Additional guidelines are available in the supplemental materials section and through the course instructor.

If a student who is a non-native speaker of English has not yet reached Restricted II on the ITA test, he/she must seek written permission to proceed with the seminar from the GPC Co-Chairs. Permission will be granted based on a combination of his/her hours of training at the ICC, and faculty observations in the department. The literature seminar presentation may be delayed based on fewer than 15 hours/semester effort at the ICC in any semester or summer.

Outcomes

Formal evaluation of the seminar will be by the course instructor, the student's advisor, and one other faculty member selected by the student (ideally a member of his/her Advisory Committee), and will include evaluation of responses to questions. The student will receive detailed feedback and constructive suggestions on the seminar from at least two faculty members, along with written feedback from the audience.

Should the seminar be determined to be deficient (recorded as failure), the instructor may allow the student to repeat the requirement before their Advisory Committee or in the Graduate Seminar setting. In this case, the deficiencies must be communicated in writing by the course instructor and advisor to the student and the Graduate Program Committee, along with a new deadline for re-presenting the seminar. The student may not proceed to defend the research progress report without a satisfactory performance on the literature seminar.

SEE ONLINE FOR: 09-911, Graduate Seminar Feedback Form
www.chem.cmu.edu/grad/guide/forms/

Research Progress Report and Candidacy Exam

Each student must write and present a detailed progress report on the current project, along with relevant background and future thesis plans for 1–2 years, and show breadth and depth of knowledge at the oral candidacy examination appropriate for a successful Ph.D. in that research area by the fourth semester in residence. The learning objectives of the requirement are for the student to:

- achieve a substantial level of understanding of the theoretical and/or experimental background of his/her current project(s), including foundational topics related to his/her work,
- demonstrate appropriate progress in obtaining and interpreting research results indicating the abilities necessary for successfully completing the Ph.D. with increasing independence,
- discuss substantively his/her ongoing work, including near-term future research plans (6–12 months) as well as the context, rationale, major questions and methods for 1–2 years of his/her potential thesis work, and
- write a report demonstrating scientific writing skills appropriate for Ph.D. work.

Note that the student's project may change from the current project after the candidacy exam. The thesis plan needs to address goals approved by the advisor in order to be potentially viable as the student's next project. Students should be aware that the advisor may still alter the research direction based on the overall needs of the student and the group.

Passing this requirement is typically the last step to Ph.D. candidacy. Normally, students will complete the research progress report in the fourth semester in residence. All students must pass the research progress report requirement by the end of the sixth semester in residence to remain in the Ph.D. program, unless there are documented exceptional circumstances. The requirement may be completed in the third semester if the student is ready and the advisor is in agreement.

Eligibility for Oral Candidacy Exam

Passing the research progress report requirement and candidacy exam is normally the last step leading to Ph.D. candidacy. Thus, the Ph.D. requirements expected in the first and second years normally must be completed before

the student may complete the oral and advance to candidacy. The report requirement includes a poster presentation to the entire department, a written report, and an oral exam by the Advisory Committee.

While two semesters as a teaching assistant are required to advance to candidacy, exceptional circumstances may occasionally delay a student's completion of this requirement and this will not require a delay in completing the progress report requirement.

Students will typically not be eligible to take the oral exam if they have not passed all attainment requirements, have not satisfied the graduate course requirement, or have not made the required consistent efforts with the ICC toward passing the English proficiency requirement. Students may petition the GPC for an exception to go ahead with the oral exam; documentation must be provided to show strong effort to date and extenuating circumstances.

Since the advisor is the primary judge of appropriate research progress for his/her group, the advisor is strongly encouraged to provide a formal written warning letter by the end of the third semester if the student may not be making sufficient research progress for success on the research progress report requirement. Early warning gives the student opportunity to improve his/her research performance, work toward an M.S., and/or pursue other advisors or other Ph.D. programs. Ideally, the student should provide a draft of the results and discussion section of the research progress report to his/her advisor in the first week of the 4th semester to aid his/her assessment of research progress.

Poster Presentation

The purposes of the poster presentation are to expose the student to a wide range of questions in preparation for the oral exam, to develop scientific speaking skills appropriate for scientific conferences, and to facilitate feedback from various members of the department.

The report is to be presented as a formal poster presentation, following ACS format, with an accompanying research overview paper (details described below). The poster presentation must include the scientific objectives in the thesis research, an overview of the necessary background material, the theoretical and experimental techniques used, and representative results obtained to date. Students should expect to present their research in approximately 5–10 minutes, repeated 3–4 times to different small groups, during the day of the poster session, and to answer questions from a wide variety of faculty members and graduate students. Attendance at the poster session portion of the progress report may be by any of the Chemistry Faculty, graduate students, or other interested members of the department or university.

Written Progress Report and Future Plans

The purpose of the written report is to summarize the student's research progress to date, demonstrate scientific writing skills appropriate for Ph.D. work, and provide context for the work presented at the poster session and assessed at the oral exam. In addition, a 15–18 page research overview (excluding References and Addendum), must be presented to members of the Advisory Committee and the Graduate Program Committee at least one week before the scheduled poster session. The report should include the following sections:

- Title page, including title, author, advisor(s), advisory committee members, date, and "In partial fulfillment of the Research Progress and Oral Preliminary Exam Requirement"
- Abstract of up to 200 words
- Introduction providing an overview of the relevant theoretical and/or experimental literature sufficient to demonstrate his/her mastery of the literature in the area of the intended thesis work, and explaining the goals and rationale of the project (3–4 pages)
- Research Progress, including representative results and discussion for work-to-date for 1–2 major projects (6–7 pages total, including tables and figures),
- Experimental, or Theoretical Analysis (3–4 pages)
- Research Plans (3–4 pages) including:

- research question(s) of interest for thesis research,
- anticipated impact and significance,
- methods, with details for immediate next steps (6–12 months) and general approaches for longer term (1–2 years) addressing goals arrived at in agreement with the research advisor(s),
- expected outcomes, and
- alternate approaches to address potential pitfalls.
- References (does not count in page limit), including titles and full lists of authors.
 - Generally, 25–50 references would be appropriate.
 - Students should take this opportunity to learn to use End Note, Mendeley, or similar software for managing references.
- Addendum (does not count in page limit), including replications, spectra, synthetic methods, details of measurements, and other materials that would be in Supplemental Information in a paper.

Reports must be in 12 pt Times New Roman or 11 pt Arial with 1.5 spacing and should follow ACS Style for references (although titles should be added). Note that students with multiple projects who wish to submit a progress report longer than 15–18 pages, excluding front matter and references, need written permission from all members of their advisory committee.

Advisors should review the draft of the report to offer suggestions and pose questions to mentor improvements in writing, but should not edit heavily. The quality of the writing should reflect the student's efforts with feedback/suggestions from the advisor on a small number of initial drafts. If the written report is not assessed as at least a conditional pass by both advisor and advisory committee chair, the exam will be delayed for up to 3 weeks for revisions but no later than one week before the end of the semester, whichever comes first. If a student does not submit a written report that the advisor agrees should be presented to the committee by the 12th week of the semester, an advisor should place the student on probation in the group with the possibility of termination from the group, and possibly from the Ph.D. program, depending on the outcome of the oral exam.

Exam Committee

The Exam Committee will normally be the student's Advisory Committee, although the Graduate Program Committee may add or approve replacing a member if additional expertise is needed in a specific area.

All committee members are expected to ask questions and should not intervene in each other's questions, except to rephrase questions, if needed, after a student's response. Attendance at the examination may be by any of the Chemistry Faculty, although they will be nonparticipating spectators. Note that members of the GPC can attend to assist with questions about requirements, policy or procedure or to facilitate completion of the outcome/feedback form.

The Advisory Committee Chair is responsible for the following aspects of the requirement:

- giving written feedback to the student, advisor and GPC on quality of the student's final written report at least 3 days prior to the oral exam,
- ensuring sufficient breadth in the oral exam to address the requirement objectives within the two hours allotted,
- keeping track of the nature of the questions asked and noting the quality of the student's responses, and
- leading the discussion to complete the feedback form and arrive at the overall outcome and providing the outcome of the exam to the student and GPC in person and in writing on the designated departmental form.

The Advisor is responsible at the exam for:

- giving feedback on quality of the student's final written report at least 3 days before the oral exam, and
- participating in asking questions, particularly to ensure that the background for the student's specific research is

assessed substantively.

Oral Candidacy Exam

The purpose of the oral exam is to assess whether the student has the necessary background knowledge to conduct his/her thesis research and to determine whether the student is on a trajectory to complete the Ph.D. successfully. The Graduate Program Committee holds a yearly information session on preparing for this exam.

Scope. The oral exam comprises a 25–30 minute student presentation and 1–1.5 hours of question and answer with the exam committee. While the student may prepare additional slides to help with answering questions, committee members may require that some questions be answered without those aids.

The scope of the advisory committees' questions may include topics directly related to the background, methods and results of the current project and future thesis directions as well as any subject matter related to the student's thesis research area. During this oral examination, the student is expected, through a prepared presentation and substantive responses to questions, to show:

- Substantial level of understanding of the theoretical and/or experimental background of the current project(s), including foundational areas relevant for future thesis work in the field,
- Appropriate progress in obtaining and interpreting results to indicate ability to complete the Ph.D. successfully and with increasing independence, and
- Ability to discuss substantively his/her ongoing work, including near-term future research plans as well as the context, rationale, major questions and methods for 1–2 years of his/her thesis work.

Because the focus of the exam is the evaluation of the student's knowledge and progress toward the Ph.D., discussion between the committee members should be limited to brief clarification of issues that the student would not be expected to know.

It is recommended that the student organize a practice oral exam with other members of his/her group and of related research groups in order to prepare for the potential range of questions in the oral exam, including fundamental background critical for the student's Ph.D. work. Since advisors generally do not attend practice exams, students are strongly encouraged to discuss their areas of study with their advisor(s) to seek guidance well in advance of the oral exam (e.g. by the start of the 4th semester).

Timeline. The written research progress report should be presented to the Advisory Committee at least one week before the scheduled poster session. When the paper is submitted, a date for the oral exam should be arranged that is acceptable to all committee members and falls within 2–6 weeks of the poster session. The student must receive oral feedback from the committee on the day of the exam and written feedback from the Advisory Committee Chair should follow in 1–3 days.

Any extension beyond the end of the fourth semester requires approval of a written petition from the student to the GPC and the agreement of the advisor. (See **Petitions for Extension** page 48)

Outcomes

Note that a passing performance requires satisfactory performance on both the written report and oral exam. The poster presentation is required as preparation for the oral exam and an early feedback opportunity, but is not normally evaluated formally. There are four potential outcomes to the progress report requirement, to be determined by majority vote of the committee: high pass, pass, conditional pass, or failure (See the Candidacy Exam Assessment Form online). In the case of failure, the committee must agree by majority on one of the following next steps:

_____ **Probation with opportunity to revise and have re-exam in the current group.** The

student may repeat the oral exam and revise the written report, continuing as a member of the group(s) on probation. The student must pass fully, without conditions, at the re-exam, within 2–4 months to continue in the group and the Ph.D. program, with the specific deadline to be set in consultation with one of the GPC Co-Chairs. Financial support from the advisor for the student must be continued during the probation. The student must pass fully on the second attempt to remain in the Ph.D. program.

_____ **Termination from group with option to change groups on a probationary basis.**

Note that in the case of co-advisors, a new, signed thesis agreement is needed if the student wishes to remain with one of the current advisors. If a change of groups is possible, the student must then fully pass the progress report requirement and oral preliminary exam in the new research group by the end of the sixth semester in residence to regain good standing and remain in the Ph.D. program. If the student is not able to join a new group officially within 1–2 months grace period (funding for a grace period is not guaranteed), he/she cannot continue in the Ph.D. program. ***Students must have 3 or more months written notice in a probation letter from the advisor prior to this result.***

_____ **Termination from the Ph.D. program.** The student cannot continue in the Ph.D. program and may transfer to the M.S. program, although funding cannot be guaranteed for M.S. students. Up to 6 units from the written research progress report may be applied toward the M.S. pending approval from their research advisor and the GPC Co-Chairs. ***This outcome is reserved for re-exams or for students who have had 3 or more months written notice in a probation letter.***

The Advisory Committee Chair should normally submit the outcome and feedback *in writing within one week* to the student, Advisory Committee, and Valerie Bridge for the Graduate Program Committee, including detailed requirements for revisions or re-exam with a specified deadline.

Any requests for extensions beyond the agreed-upon deadline must be made and approved in writing by the GPC co-chairs; otherwise, the student is at risk for termination.

In the case of failure, the Advisory Committee Chair must share the draft with the GPC Co-chairs to ensure sufficient feedback about deficiencies and clear expectations for revisions or a re-exam or reasons for failure and termination. He/she is encouraged to circulate the draft by email to the Advisory Committee in all cases.

SEE ONLINE FOR: Research Progress Report and Candidacy Exam Guidelines, Procedure and Assessment Forms for Written Report & Oral Exam
Candidacy Exam Assessment Form – Oral Preliminary Component
Candidacy Exam Assessment Form – Written Research Progress Report Component
www.chem.cmu.edu/grad/guide/forms/

Original Research Proposal

Each student is expected to write and defend an original research proposal during the sixth semester of residence. The learning objectives of the proposal are to demonstrate that the student has the ability:

- to generate ideas for original research, and
- to defend the methods and importance of the research
- to speak effectively about chemical research to an audience of faculty and peers, and
- write a report demonstrating scientific writing skills appropriate for Ph.D. work.

Developing a proposal distinct from the thesis provides valuable experience in building on current expertise to address new research problems and convincing others of the importance and feasibility of the work, as will be needed in most careers whether the position is in academia, industry or government. It is also an opportunity for breadth useful for adapting to changing priorities in business or society.

Eligibility for oral exam. Students will typically not be eligible to take the original proposal oral exam if they have not passed the research progress report/candidacy exam, and the English proficiency requirement. Students may petition the GPC for an exception to go ahead with the oral exam; documentation must be provided to show strong effort to date and extenuating circumstances.

If a student has not submitted a complete written proposal by the 11th week of the semester and has not submitted a petition for extension, he/she is not eligible to have the oral exam and is on probation pending review by the GPC for possible termination from the Ph.D. program at the end of the semester.

Topics. To ensure sufficient originality and promote feasibility within the desired timeline, topics must be approved by the student's Advisory Committee and at least one member of the Graduate Program Committee who is not on the student's advisory committee to ensure the topic is distinct from the student's thesis work (see timeline under Topic Approval). The topic need not exclude the general field of the student's research but should use some primary sources outside his/her specific dissertation topic. In general, topics should go at least one step beyond what has been published. In addition, to the student's knowledge, work on the same hypothesis should not have been proposed before. In order to produce work distinct from the thesis topic and to facilitate an oral exam of appropriate scope, depth and rigor, students are encouraged to propose work that could conceivably be done in their lab or group (however not restricted to the instrumentation currently available). Students who wish to pursue work distant from their field of interest are advised to include information in their topic description and discuss two issues with their advisory committee members and the GPC member reviewing the topic to make sure they can complete the proposal with appropriate rigor: (1) whether the committee members view their expertise as sufficient to serve as an examiner or can recommend an alternate member, and (2) whether the student's background is sufficient to complete the proposal successfully in the available time.

Topic Approval. Descriptions of topics (approximately 1–2 pages) are due the third week in November for students who are due to complete proposals in the spring semester. Note that students entering in January will have their deadlines on third week of July for topic submissions and September 15 for final topic approval.

The topic descriptions must include (1) a statement of the problem to be addressed and the proposed approach, (2) several key references to show that the approach is viable, and (3) a discussion of similarities and differences compared with the student's thesis work to date and to related work reported in the literature, with affirmation of the committee as examiners or listing the alternate member, and the student's relevant background/experience for topics distant from the thesis work (e.g. in a different area such as a theorist proposing synthetic work). Written approval from the advisory committee and a member of the GPC who is not on the advisory committee is needed for final topic approval by December 15. A significant change in topic at any point must be re-approved by the student's advisory committee and one member of the GPC.

Each student should submit his/her proposed topics to the Advisory Committee and at least one member of the GPC. All Advisory Committee members must agree that the proposed topic is acceptable. If a student has not received his/her entire committee's approval and the approval of one member of the GPC by 6 weeks after the topic submission due date, the student will submit a petition for extension explaining the concerns or differences of opinion about the topic. Note that typical reasons for rejecting a topic would include insufficient chemical content involved in addressing the question, lack of feasibility, lack of sufficient distinction from the student's dissertation research, or too much distance from the student's background to master sufficiently in the time available.

If the student is not able to address their Advisory Committee members' concerns successfully by 8 weeks after the topic is due, the student will be put on probation. Subsequent failure to write and adequately defend the proposal by the end of the seventh semester would be grounds for termination from the program.

Written proposal. Like proposals submitted to a funding agency, students' original proposals will be expected to have major sections which accomplish the following goals, with subheadings to be determined in consultation with the research advisor(s):

- **Abstract**
- **Introduction** (4–5 pages)
 - state the idea and motivating scientific hypothesis, or specific aims,
 - justify the importance of the scientific problem,
 - review the relevant theoretical and/or experimental background literature, and identify the gap that your proposal addresses (e.g. unanswered questions, limitations that you propose to overcome),
- **Proposed Research** (10–11 pages)
 - propose the specific research, including details about the theoretical and/or experimental techniques
 - include an estimate of capital costs if nonstandard or specialized equipment is required,
 - predict results, including discussing possible outcomes and how you would interpret them and demonstrating that the approach is feasible by calculation or reference to previous literature,
 - discuss alternate approaches to address potential pitfalls, and
 - discuss the significance of the research.
- **References** (no page limit, 30–50 references would be typical)

Proposals should be no more than 15 pages of text, including figures but excluding references, in a font no smaller than 12 point Times with 1.5 spacing. The student is free to consult with anyone, including the advisor, in developing the proposal, but the advisor's role should be non-directive and the work should represent the student's own creative thinking. A final version of the proposal must be distributed to Advisory Committee members at least one week before the scheduled examination date.

Pursuing guidance and feedback. While the original proposal should be produced largely independently, students are expected to pursue sufficient feedback to complete the proposal in a timely way. The student is encouraged to seek feedback and guidance from his/her committee chair in week 6 after the topic is approved and responsible to consult his/her advisor and the GPC Co-Chairs by week 11 if progress is not on track for an oral exam within the next 3–4 weeks. A student who does not submit a draft of a written proposal to his/her advisor by week 11 will typically be placed on probation until the proposal oral exam is completed, unless a petition for extension is approved. Students are also encouraged to consult the following resources in developing and writing the proposal:

NIH's Writing Your Application, particularly NIH peer review criteria and writing tips (grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm)

Write Like a Chemist: A Guide and Resource by Marin Robinson, Fredricka Stoller, Molly Costanza-Robinson, available online at the MI Library (site.ebrary.com/lib/cmu/detail.action?docID=10246242).

Exam Committee. The Exam Committee will normally be the student's Advisory Committee. As a condition of approving a topic, the Graduate Program Committee member or Advisory Committee Chair may add or approve replacing a member if additional expertise is needed in a specific area.

All committee members are responsible for asking questions and should not intervene in each other's questions, except to rephrase questions, if needed after a student's response. Note that members of the GPC can attend to assist with questions about requirements, policy or procedure or to facilitate completion of the outcome/feedback form.

The Advisory Committee Chair is responsible for the following:

- giving feedback to the student, advisor and GPC on quality of the student's final written proposal at the end of the oral exam,
- ensuring sufficient breadth in the exam to address the requirement objectives,
- keeping track of the nature of the questions asked, noting the quality of the student's responses,
- leading the discussion to complete the feedback form and arrive at the overall outcome and providing the outcome of the exam to the student in person and in writing to both the student and GPC using the department's designated form.

The Advisor is responsible at the exam for:

- giving written feedback on quality of the student's final written proposal at end of the oral exam, and
- participating in asking questions, particularly to ensure that the methods for the student's proposed research is assessed substantively.

Oral defense. The defense comprises a public seminar (approximately 30–45 minutes in length) and a private oral examination by the student's Advisory Committee. One more member may be added by the student or the Graduate Program Committee as a condition of topic approval if more expertise in a specific area is desirable. Attendance at the examination may be by any of the Chemistry Faculty, although they will be nonparticipating spectators.

During this oral examination, the student is expected to demonstrate a thorough understanding of the literature and methods relevant to the proposal, including any material mentioned in the written proposal or oral presentation. While some of the questions may not have clear-cut answers, the Committee will evaluate the student's ability to reason effectively and draw appropriately on a broad range of knowledge to do so. In addition, the student's skill in speaking and writing about chemistry will be assessed.

Outcomes. Passing the original proposal requirement typically leads to All-But-Dissertation status. There are five potential outcomes to the original proposal, to be determined by majority vote of the committee: high pass, pass, conditional pass, conditional pass with probation, or failure. Additional work may be required to pass as follows, and the Advisory Committee sets the specific deadline using these guidelines:

_____ **High Pass** indicates outstanding performance based on **overall assessments of excellent or good and no deficiencies in the four objectives above** (page 37).

_____ **Pass** indicates clearly satisfactory knowledge of both fundamental theory and research methods, along with satisfactory research progress that is on a trajectory to successful completion of the Ph.D. **Students should have at least two areas of good or excellent overall performance and no deficiencies.** A student may not pass without at least "pass" on writing quality.

_____ **Conditional pass** indicates that the deficiencies are deemed minor and that additional work over a short period (2–3 weeks) is expected to polish skills and help bring out the best in the student. The student's performance may be recorded as a conditional pass and the student required either to revise the written report, give a revised presentation to the Advisory Committee, or otherwise address deficiencies in writing or in person as requested by the committee. **Students must have not more**

than one overall deficiency and may have no failures.

_____ **Conditional pass with probation** indicates that the deficiencies are considered significant (e.g. important fundamental errors in background knowledge, major misunderstanding the literature relevant to the proposal). Re-exam by the committee and revising the written report is normally required in this situation; advisory committees may assign additional written follow-up as appropriate. The re-exam is required within 1–2 months. **Students must have at least satisfactory (“pass”) performance in two of the first three areas and have failure in no more than one area (including speaking ability).**

_____ **Failure** indicates grave concerns about a student’s ability to generate ideas and design research independently such that the advisor and committee question the student’s ability to complete a Ph.D. in this research area. **Re-exam is normally permitted on a first-attempt and the student is on probation, with financial support from the advisor continued if there is an intervening summer.** If a student fails, the committee must agree **by majority** on one of the following actions:

_____ Advisor(s) permit an oral re-exam and revision to the proposal typically within 2–3 months, upon agreement of the GPC Co-Chairs. The student must pass fully on the second attempt to remain in the Ph.D. program. If co-advisors cannot agree on the outcome during the deliberation, the matter will be referred to the Department Head and/or his/her designate(s) for resolution.

_____ Advisor(s) will terminate the student from his/her group(s). If the student is terminated from the group and cannot join a new group within a 1–2 month grace period, he/she would be terminated from the Ph.D. program. If a change of groups is possible, the student may be accepted only on a probationary basis and given up to 3–4 months to pass the original proposal while simultaneously conducting research satisfactory to the new advisor. **Note that, at the discretion of the Graduate Program Committee, a new progress report may also be required for students who change major research areas.**

Note that if there are suspected academic integrity issues, the person identifying the concern must gather the evidence and discuss the matter with the department head or GPC Co-Chairs according to the departmental academic integrity procedures and penalties, when warranted, will be determined separately from the outcome of the written progress report. The concern should be kept confidential and not be raised with the Advisory Committee at the exam.

In each case, the deficiencies must be communicated in writing by the Advisory Committee Chair to the student and the Graduate Program Committee, along with conditions to be satisfied in order to pass and a new deadline for re-defending the proposal, if a re-defense is required, reported in writing by the Advisory Committee Chair to the student and the Graduate Program Committee by the next day.

A student may not achieve ABD status without a satisfactory performance on the original proposal. Failure to defend an original proposal successfully by the end of the seventh semester in residence is grounds for termination from the Ph.D. program.

SEE ONLINE FOR: Original Research Proposal Requirement Outcome & Feedback Form
www.chem.cmu.edu/grad/guide/forms/

Advancement to Candidacy and All-But-Dissertation Status

Students' status in the program will be reviewed each year (described under Annual Reviews, page 47). During the first two years in the program, a student is referred to as a "Ph.D. student." Upon successful completion of the first two years of requirements through the research progress report and oral exam, listed below, a student advances to candidacy, which designates completing a major portion of the requirements for the Ph.D. listed below:

- Attainment examinations or approved coursework in the related areas
- Selection of a Research Advisor
- Selection of an Advisory Committee
- The equivalent of at least four full-semester graduate courses in chemistry or related fields with a grade of B in each course
- Literature Seminar
- Research Progress Report and Candidacy Exam
- Satisfactory teaching for two semesters as a Teaching Assistant, including planning and completion of a mentored teaching experience for those students who have not been a recitation TA or laboratory TA by the end of the second year,
- English Language Proficiency of Restricted II on the ITA test (if a non-native speaker of English).

Completion of the Ph.D. candidacy requirements along with the research proposal will mark attainment of the status designated **All But Dissertation (ABD)** by Carnegie Mellon.

In accordance with university policy, ABD students must complete the Doctoral Candidate form to declare their intention to complete their dissertation in residence (on campus) or *in absentia* (off campus).

Students meeting the normally expected deadlines reach candidacy and ABD status by the sixth semester in residence.

Statute of limitations. ABD students must complete their remaining degree requirement, namely produce and defend publicly an approved dissertation, within ten years of initial enrollment, per Carnegie Mellon University Policy on Doctoral Student Status. Extraordinary circumstances may necessitate the department to seek an extension of the candidacy status. An extension, however, requires approval by the Dean. Additional information about ABD policies, leaves of absence, and *in absentia* status is available in the Graduate Studies Office.

SEE ONLINE FOR: All-But-Dissertation Status Agreement
www.chem.cmu.edu/grad/guide/forms/

RELATED POLICIES RELEVANT FOR ALL-BUT-DISSERTATION STUDENTS

Carnegie Mellon University Policy on Doctoral Student Status

www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html

This is a series of policies that set forth a definition of All But Dissertation (ABD), time limits on doctoral candidacy status, a definition of in residence and *in absentia* status for ABD candidates and the tuition charged for candidates in each status. The ABD status agreement form and ABD status change form can be found at: www.cmu.edu/es/forms/abd-process.pdf.

Carnegie Mellon University Statute of Limitation for Ph.D. Degree

As outlined in the Doctoral Student Status Policy, www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html, students will complete all requirements for the Ph.D. degree within a maximum of ten years from original matriculation as a doctoral student, or less if required by a more restrictive department or college policy. Once this time-to-

degree limit has lapsed, the person may resume work towards a doctoral degree only if newly admitted to a currently offered doctoral degree program under criteria determined by that program.

Under extraordinary circumstances, such as leave of absence, military or public service, family or parental leave, or temporary disability, a school or college may, upon the relevant department's recommendation and with the written approval of the dean, defer the lapse of All-But-Dissertation status for a period commensurate with the duration of that interruption. Students, who are pursuing the Ph.D. degree as part-time students for all semesters of their program, as approved by their program, may also appeal to their program or department for extension of the time to degree limit.

Dissertation Progress Meetings

Expectations

To ensure ongoing and timely discussion of the student's progress after he/she reaches ABD status, the Advisory Committee Chair should work with the student to convene a meeting approximately annually after the third year. The goals of the meeting (in most cases, though it may vary with the student's research group) are to:

- review research accomplishments since the research progress report,
- review the planned scope of the dissertation based on an outline,
- discuss the estimated timeline for completing the needed work,
- identify and deal constructively with obstacles to completing the plan, and
- provide advice for professional development and career planning/job searches, including progress on program objectives such as speaking, teaching/mentoring, and writing at the Ph.D. level.

A brief written summary of the meeting should be prepared by the Committee Chair and shared with the student, Advisory Committee members, and the Graduate Program Committee, preferably using the form available at: www.chem.cmu.edu/grad/guide/forms/

Outcomes

If, at any of these meetings, the Advisory Committee finds the student's performance to a significant concern, the student's Research Advisor and/or Committee Chair should communicate these concerns to the Graduate Program Committee within one week. The Graduate Program Committee will review the student's standing in the program at the time of the last departmental review and possibly recommend a committee meeting very soon. In serious cases of little or no progress or lack of annual committee meetings, the advisor, in consultation with the Advisory Committee and the GPC Co-Chairs, may place a student on probation in the group if he/she is considering terminating the student from the group (see **Academic Actions and Appeals**, pages 49–51).

Probation in the group would normally last for 3–4 months during which the student would retain their level of financial support. The advisor is expected to notify the student in writing of the conditions for regaining good standing in the group and when those conditions have been satisfied. If an ABD student is on probation, he/she is strongly advised to consult the departmental ombudsperson regarding strategies to address the situation. Note that, since opportunities to change research groups after reaching ABD status are quite rare, probation as an ABD student comes with a significant risk of termination from the group and Ph.D. program.

Residency

University regulations require one year of full-time residency for the Ph.D.

Doctoral Dissertation and Public Defense

The student must write and publicly defend a Doctoral Dissertation. The University standard for the Ph.D. degree states that the thesis must embody the results of extended research, constitute an original contribution to

knowledge, and include material worthy of publication. It must demonstrate the candidate's ability to conduct an independent investigation, to abstract principles from which predictions can be made, and to interpret in a logical manner facts and phenomena revealed by the research. This requirement must be satisfied within seven years of the attainment of ABD status, by regulations of the Mellon College of Science if that is sooner than University statute of limitations of ten years.

SEE ONLINE FOR: MCS Policies on Doctoral Degrees such as Guidelines on Doctoral Thesis Committees
www.cmu.edu/mcs/fac_staff/handbook/doctoral.html
Doctoral Student Status Policy (including statute of limitations)
www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html

M.S. Requirements

Please note that the requirements for the M.S. in Chemistry are not a subset of the Ph.D. requirements. Interested students may need to complete additional work to receive the M.S. Students interested in receiving the M.S. are advised to consult with Dr. Rea Freeland as soon as possible, ideally by the start of the second year in residence.

M.S. in Chemistry

Students may earn the M.S. in Chemistry in the normal course of pursuing the Ph.D. by fulfilling the requirements below. Note that students are not admitted for the purpose of earning the M.S. degree and the department does not offer financial support for students wishing to pursue the M.S. as a terminal degree.

Candidates for the M.S. in Chemistry are assigned to an Academic Advisor for the M.S. Degree, who coordinates with the Chair(s) of the Graduate Program Committee and the Department Head. The Academic Advisor for the M.S. Degree meets with the student to formulate a course of studies, and annually thereafter to assess the progress of the student.

Candidates must complete at least 96 units of work, distributed with some flexibility but subject to the following constraints:

1. A minimum of 48 units must be in graduate lecture courses in Chemistry.
2. No more than 18 units may be in undergraduate courses in Chemistry. These must be in upper-level courses (400 level or above) and may include no course equivalent to one previously required to complete a degree in any other college or university.
3. Relevant upper-level undergraduate or graduate courses in other departments or at the University of Pittsburgh (through cross-registration policies) may be taken for credit toward the 96 units, with the approval of the Director of Graduate Studies.
4. To be used for credit, no grade shall be lower than C. The average grade of 96 units, of the first 120 units attempted, must be at least B. Graduate Teaching, 09-931/2 may not be applied as course credit toward the M.S. degree.
5. Graduate research credit — candidates who elect to apply units earned in graduate research toward the M.S. degree must complete not fewer than 20 units of 09-861 (Graduate Research). If more than 25 units of graduate research are to be credited, substantial evidence of research accomplishment or proficiency must be presented. Such evidence can be in the form of a dissertation, or in the significant authorship of scientific publications, or the equivalent, and must be approved by the Research Advisor and the Director of Graduate Studies.
6. If no more than 25 units of graduate research are to be credited toward the M.S. degree, evidence of research proficiency may be provided by the successful completion of the Literature Seminar requirement of the Ph.D. Requirements.

M.S. in Polymer Science

Within the general requirements of the Master of Science in Chemistry, the Master of Science in Polymer Science provides the basic background for scientists and engineers to pursue technical careers in industries that manufacture, process and use polymeric materials. In consultation with an advisory committee, the student will arrange a course of studies designed to fit his or her background and career goals. Of the total 96 units, 36–48 units will be required in basic science. Students without prior research experience are encouraged to undertake a research project in collaboration with a faculty supervisor. Faculty members in this research area include Tomek Kowalewski, Krzysztof Matyjaszewski, Gary D. Patterson, and Newell Washburn.

M.S. in Colloids, Polymers and Surfaces

The Interdisciplinary M.S. in Colloids, Polymers and Surfaces (CPS) degree is a joint program with Chemical Engineering designed for professionals working in the polymer field. Participating faculty include Andrew Gellman, Tomek Kowalewski, Kris Matyjaszewski, Gary D. Patterson, Lynn Walker and Newell Washburn.

The program is open to students with a bachelor's degree in science or engineering. Courses are arranged to permit a part-time student to complete the degree work in two years by attending late afternoon and evening classes and by working on a research project during the summer.

Evaluation of Student Standing and Progress Toward Ph.D.

Role of the Graduate Program Committee

The Graduate Program Committee (GPC) serves the following functions:

- Advises first-year graduate students on course selection and other academic matters until a Research Advisor is selected,
- Works with students' Advisory Committees to review and approve topics and selects additional committee members, as needed, for original research proposals,
- Monitors students' progress in annual reviews, based on input from the student and advisor, and provides written feedback to students,
- Reviews petitions for extensions on program requirements,
- Meets jointly with the Graduate Student Advisory Committee to discuss student feedback and concerns about the program, and
- Provides ongoing assessment and review of the graduate program, proposing changes as needed.

The Graduate Program Committee Co-Chairs provide the following functions:

- Advise students or faculty members on matters that they may wish to bring to the GPC,
- Advise students on the selection of Advisory Committee members,
- Organize periodic information sessions about the Ph.D. requirements,
- Write warning and/or probation letters in relation to difficulties in satisfying program requirements (e.g. low grades, not satisfying the English proficiency requirement),
- Reviews advisors' warning and probation letters to students to aid in consistency with the handbook, and
- Review formal academic actions, other than granting of degrees, such as placing a student on probation in the Ph.D. program or terminating an ABD student from the program.

The Associate Head serves on the GPC and works closely with the GPC Co-Chairs and Department Head to:

- Advise students and faculty members on general graduate affairs,
- Serve as a consultant for students on the selection of advisors and Advisory Committee members,
- Provide input to the Director of Undergraduate Studies on TA assignments as requested,
- Track and facilitate students' timely graduations wherever possible, and
- Serve as graduate ombudsperson for Chemistry graduate students.

When an immediate action is required, the Chair(s) of the Graduate Program Committee may act for the Committee. The Chairs are also available to advise students or faculty on matters that they may wish to bring to the GPC.

Annual Reviews

Each fall the Graduate Program Committee will solicit brief status reports from each student in the program, along with a written response from the student's advisor, to serve as the basis for an annual review of students' progress through the graduate program. The primary goals of the Annual Review are (1) to check for and address significant concerns of students and/or advisors that may significantly affect a student's timely progress to the Ph.D. and (2) to facilitate advisor feedback on issues or skills important for students' future career development, particularly those that may otherwise fall into the background during the year. The major components of the review process are:

- The student's status report, approximately 4–6 pages long, addressing specific questions distributed in advance and posing questions/topics for discussion with the advisor (e.g. recommended reading or study topics for the

candidacy exam, opportunities for conference presentations, skills desired for career plans, progress on program objectives such as scientific writing),

- Advisors typically meet each student prior to submitting written feedback to both discuss the student's status report and to enable the student to ask questions about the advisor's written feedback.
- Upon agreement of the advisor, the brief status report, along with the advisor's written feedback and other relevant data such as grades and ICC work, will serve as the basis for review by the Graduate Program Committee.
- The GPC provides brief written feedback including the student's standing in the program, progress on Ph.D. requirements, and suggestions for improvement.

Since students do not attend the annual review meeting, they are encouraged to meet with the GPC Co-Chairs prior to the review if they wish to share additional information with the committee relevant to the review. Advisors or students who have concerns that are difficult to express in their written reports should consult with the one of GPC Co-Chairs to discuss how to best communicate their concerns.

SEE ONLINE FOR: Student Brief Status Report for Annual Review
Advisor Feedback to Student for Annual Review
www.chem.cmu.edu/grad/guide/forms/

Petitions for Extension

An extension of any of the Department's program requirements requires petitioning the Graduate Program Committee, (1) explaining what makes the circumstances exceptional, (2) proposing an alternate deadline, and (3) providing a plan for satisfying the requirement as soon as possible. For example, serious illness or a death in the family would be exceptional circumstances, and the desire to finish a paper for publication would not be exceptional. Extensions may be given by the advisor, in consultation with the GPC Co-Chairs, only for health issues when circumstances are urgent or serious and do not allow time for a formal petition to the Graduate Program Committee. However, even in the urgent case, the advisor must provide some written record (e.g. a short email) to support an extension until discussion with the student can be reasonably arranged.

All petitions for extensions need to include a specific plan for satisfying the requirements. In addition, students on probation must offer a plan for gaining good standing. All plans must include a timeline with observable milestones in terms of courses, projected grades, TA assignment (if any is expected), and concrete evidence of research progress such as written research reports, posters or papers accepted at meetings, submitted publications, and/or patent applications. Supporting documents need to be attached with the petition as evidence of current research progress. A physician's or psychologist's note is needed to support a semester of extension based on ongoing personal/health issues, as opposed to a leave of absence which might also be considered for serious personal/health issues when the student would not be able to work full-time.

The normal extension request is for an additional 2–6 weeks, or up to one semester, with the possibility of an additional extension for students who have changed groups and need to establish research in the new group prior to the research progress report requirement or who have documented exceptional circumstances. As part of the petition review, the student, advisor or GPC may request formal input from the student and the advisory committee, and the advisor and GPC may place additional conditions on the continuation of the student in the Ph.D. program as a result of the review.

In general, petitions for extensions should be received four weeks before the start of the semester in which completion of the requirement is expected or as soon as possible, if the reason for the extension request is health or personal and cannot be foreseen. Note that extensions for the original research proposal will be granted only in rare cases.

If a potential extension is discussed with either of the GPC Co-Chairs in person, it is the student's responsibility to summarize any agreements made in writing for consideration by the GPC. Requests should not be considered approved until written approval comes from the GPC.

Academic Actions and Appeals

The department is committed to supporting students in meeting the standards set by their research advisors and to ensuring that all students maintain the high standards of performance that reflect Ph.D. quality work. The following procedures are designed to give students a reasonable opportunity to correct deficiencies in their work when needed and to make a transition to other future plans when some requirements by the advisor or department are not satisfied.

Failure on a Ph.D. Program requirement. Failure on either the research progress report/candidacy exam or the original research proposal requirement requires a majority decision of the advisory committee at the exam with the assessment forms with detailed comments provided in support of the decision. The student has the right to appeal within 7 days following the decision following the University's grievance procedure for graduate students. However, failure on either examination can lead to immediate withdrawal from the Ph.D. program with the option to transfer to the M.S. program. Financial support is not guaranteed for completion of the M.S., although a terminal semester with TA support may sometimes be possible as described under **Termination from the Ph.D. program** (page 50).

Departmental Warnings or Probation. Students who do not make satisfactory grades or do not complete other requirements at the expected time typically receive a warning letter from the GPC indicating when they are at risk for losing good standing in the Ph.D. program or will receive a probation letter when they are at risk for possible termination from the Ph.D. program. Failure to make consistent efforts with the ICC on English proficiency may also lead to departmental probation.

Advisors ending research-advisor relationship with a student. Advisors may terminate a student from the group, for example, based on a student's inability to learn how to produce reliable results within a reasonable period of time and while using reasonable resources. Faculty members are strongly encouraged to consult the GPC when they observe early signs of concerns about a student's performance or progress. Difficulties that cause the advisor to consider terminating a student should be documented by the advisor in written feedback and discussed in person in a timely way, as discussed below. Such discussions should be included, when needed, formally as part of the annual review and the GPC can assist advisors and students at other times when they may have concerns.

Faculty and departmental concerns will generally be expressed in two forms, warning letters or probation letters. The GPC Co-Chairs need to review a copy of any warning or probation letters before they are sent to ensure compliance with departmental and university policies.

1. Warning letter: If an advisor is dissatisfied with one of his/her student's progress or efforts in research, he/she is strongly encouraged to provide both in person and in writing a warning to the student about the areas of concern and the criteria for continuing as a member of the group in good standing to assist in addressing the concerns promptly. Students may also receive a warning letter from the GPC for low grades or delays in working on program requirements. Normally, such a notice would specify a plan for monitoring the student's progress toward the desired performance or progress. If the concerns are serious enough that the student may be terminated from the group or Ph.D. program, the warning letter should provide, when possible, 6 months written notice of when financial support would be terminated if the concerns are not adequately addressed.

2. Probation letter: If an advisor has serious concerns and may wish to terminate a student from his/her group, he/she should consult with the GPC Co-Chairs about the details of proceeding to put the student on probation in the group. In addition, failure to complete Ph.D. program requirements on the expected schedule can lead to probation. The minimum recommended probation is 3–4 months, during which time the student's financial support as a TA or RA will continue, and will be typically maintained by the advisor if the probation occurs in the summer. Probation letters must include a written notice of when financial support would be terminated if the concerns are not addressed satisfactorily; these letters must be approved by the GPC Co-Chairs. Students on temporary visas are advised to consult with OIE at the start of any probation to discuss visa implications in the event of potential termination that semester.

Note that Annual Review feedback may serve the purpose of a probation or warning letter.

Eligibility to change advisors

A student may change advisors only once, and such changes should occur in the first 1–2 years if at all possible to complete the degree in a timely way.

If terminated from his/her group prior to reaching ABD status or if choosing to change advisors, a student may request a 1–2 month grace period to find another advisor before termination from the Ph.D. program, although financial support cannot be promised during this period. After this grace period, a student without an advisor cannot remain in the Ph.D. program. Where possible and appropriate, TA positions or other assignments may be offered, depending on availability of funds and positions. However, if a student is without a research advisor, the department cannot guarantee funding.

If an advisor wishes to terminate a student from his/her group after the student achieves ABD status, the student may request a formal meeting with the advisory committee and at least one GPC Co-Chair to review the grounds for the decision and to explore options for the student to complete the M.S. or possibly change to another group if the majority of the advisory committee is supportive of such a change.

If a student is on probation in one group but otherwise in good standing in the department (as described under Research Advisors, page 30), he/she remains eligible to change advisors. If a student is on probation for lack of timely progress on departmental requirements and a new advisor is willing to consider the student for his/her group, the student may only be accepted in the group on a probationary basis and remains at risk for termination at the end of the semester in which he/she changed groups if the advisor's expectations are not satisfied and the cause for departmental probation has not been satisfactorily addressed.

Termination from Ph.D. program

If a student is not making adequate and timely progress through the program requirements or on dissertation research and no exceptional circumstances have been documented in petitions approved by the Graduate Program Committee, the GPC may place a student on probation and state the criteria or conditions to regain good standing. If a student does not adequately address the concerns on the timeline specified in the annual review memo or the probation letter, the GPC may require the student to withdraw from the Ph.D. program.

With GPC and department head approval, the student may be eligible to work toward the M.S. program for a terminal semester if there is a means of financial support, or to transfer to the M.S. without financial support. Note that students who have already completed the M.S. in Chemistry requirements will not be eligible to transfer to the M.S. program and typically are not eligible for TA support. A terminal semester with support to complete the M.S. program normally requires a double TA assignment; there needs to be an available TA position for which the student has suitable background in order for the student to receive a stipend as a TA.

A student will not normally be terminated from the Ph.D. program without the warning of three months of probation, nor will financial support normally be terminated without three months warning, normally in a probation

letter from either the advisor or the department. Six months notice will be given when possible. Limited exceptions with less notice may occur. For example, an advisory committee's decision based on failure of a program requirement may lead to termination in less than three months. Also, extended, unapproved absences, serious misconduct covered under university policies, such as scientific misconduct, violations of academic integrity, misuse of computing resources, and workplace threats or violence, all include dismissal as a potential sanction.

Appeals

A student may appeal academic decisions (e.g. grade, probation, termination) by an instructor, the GPC, advisor, or advisory committee following the university procedure for graduate student grievances. The student may also consult with any member of the GPC or the departmental graduate ombudsperson in an advisory capacity prior to an appeal. A summary of the processes available to Carnegie Mellon graduate students who seek review of academic and non-academic issues is available at:

www.cmu.edu/graduate/policies/appeal-grievance-procedures.html

Additional Department and University Policies/Protocols

Assistance for Individuals with Disabilities

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical and programmatic campus access to all events and information within the Carnegie Mellon community. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Sections 503 and 504 of the Rehabilitation Act of 1973. Students who would like to receive accommodations must submit a Voluntary Disclosure of Disability Form (www.cmu.edu/education-office/disability-resources/student-information-and-services/voluntary-disclosure-of-disability.pdf) to access@andrew.cmu.edu to begin the interactive accommodation process.

For more information please see www.cmu.edu/education-office/disability-resources/. Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Catherine Getchel, 412-268-6121, getchell@cmu.edu to access the services available at the university and initiate a request for accommodations.

Safeguarding Educational Equity Policy Against Sexual Harassment and Sexual Assault

Sexual harassment and sexual assault are prohibited by CMU, as is retaliation for having brought forward a concern or allegation in good faith. The policy can be viewed in its entirety at: www.cmu.edu/policies/documents/SA_SH.htm. If you believe you have been the victim of sexual harassment or sexual assault, you are encouraged to make contact with any of the following resources:

- Office of Title IX Initiatives, www.cmu.edu/title-ix/, 412-268-7125
- Sexual Harassment Advisors, found in appendix A of the Policy Against Sexual Harassment and Sexual Assault;
- Survivor Support Network, found in appendix B of the Policy Against Sexual Harassment and Sexual Assault;
- Sexual Harassment Process and Title IX Coordinators, found in section II of the Policy Against Sexual Harassment and Sexual Assault;
- University Police, 412-268-2323
- University Health Services, 412-268-2157
- Counseling & Psychological Services, 412-268-2922

Carnegie Mellon University Student Health Insurance Policy

Note that you are personally responsible for maintaining health insurance and paying the related costs each year; otherwise, you may not be eligible to register, which in turn means you cannot receive a stipend.

www.cmu.edu/policies/student-and-student-life/student-health-insurance.html

Maternity Accommodation Protocol

www.cmu.edu/student-affairs/theword/acad_standards/creative/studentmaternityprotocol.html

Students whose anticipated delivery date is during the course of the semester may consider taking time away from their coursework and/or research responsibilities. All female students who give birth to a child while engaged in coursework or research are eligible to take either a short-term absence or formal leave of absence. Students in course work should consider either working with their course instructor to receive incomplete grades, or elect to drop to

part-time status or to take a semester leave of absence. Students engaged in research must work with their faculty to develop plans for the research for the time they are away.

Students are encouraged to consult with relevant university faculty and staff as soon as possible as they begin making plans regarding time away. Students must contact the Office of the Dean of Student Affairs to register for Maternity Accommodations. Students will complete an information form and meet with a member of the Dean's Office staff to determine resources and procedures appropriate for the individual student. Planning for the student's discussion with her academic contact(s) (advisor, associate dean, etc.) will be reviewed during this meeting.

Enrollment and Degree Verification

Enrollment Services is the only University office that can provide an official letter of enrollment, official transcript and enrollment verification. Enrollment verification can be requested online through The HUB at:

www.cmu.edu/hub/records/verifications/.

Degree verification for employers can be provided through the same web site. A departmental timeline for graduation and job search planning to help graduating students coordinate the steps prior to their defense and degree certification can be obtained online (www.chem.cmu.edu/grad/guide/forms/) and from Valerie Bridge.

Carnegie Mellon University Doctoral Student Status Policy

This policy establishes important details related to degree completion options, including a description working on your degree *in absentia* after reaching All-But-Dissertation ABD status.

www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html

Summary of Graduate Student Appeal and Grievance Procedures

University process: www.cmu.edu/graduate/policies/appeal-grievance-procedures.html

Departmental process: See Graduate Ombudsperson, p. 59.

Policies on Time Off, Leaves, and Withdrawals

MCS Policy on Graduate Student Time Off

Consult this policy before planning your time away from campus and be sure to seek approval from your advisor (or the Co-Chairs or Associate Head before you join a group) before planning any travel.

Students with graduate assistantships are expected to continue with their research during academic breaks (including summer months) with the exception of official University holidays. Paid time off for personal business or vacations generally is not included as part of a graduate's financial support. A supported graduate student who wants to take a short break (one or two weeks) must get approval for that break from his/her advisor and, if required by the terms of the student's support package, must make up the work.

Supported graduate students wishing to take longer periods of personal time off must do so without financial support. The advisor will notify the Department's Business Office of any such arrangements so that an appropriate adjustment in the student's support can be processed.

The timing and length of any time off must be approved in advance by the advisor before travel commitments are made. Before absences, the student must discuss with the supervising faculty member(s) ways to ensure that his/her progress is satisfactory and that research and/or teaching responsibilities can be met satisfactorily. Students with TA responsibilities are expected to be on campus to attend any department required TA training and at the end of the semester to finish grading or other duties assigned by the department.

Leaves of Absence

In certain circumstances such as health problems or changes in family circumstances, students may wish to consider a brief leave of absence from graduate study. Details about whether and how to pursue this option are available by consulting Valerie Bridge or the department graduate ombudsperson (p. 59).

Carnegie Mellon University Student Leave Policy

www.cmu.edu/policies/student-and-student-life/student-leave.html

Process for Taking & Returning from Leave of Absence

University process: www.cmu.edu/hub/registration/leave.html

Process for 'Withdrawal' from Program.

University process: www.cmu.edu/hub/registration/leave.html

Computing

Carnegie Mellon University Computing Policy includes penalties related to inappropriate downloading, which may involve possibly losing internet access for a period of time.

www.cmu.edu/policies/information-technology/computing.html

New Policies/"Grandfather" Policy

Students must complete the academic program requirements in place when they enter unless they elect newer ones in writing. When requirements are changed, it is because the department believes the new rules offer an improvement; any such changes will be discussed at a meeting with the graduate students. However, students currently enrolled whose degree program is affected by a change in requirement may choose to be governed by the older requirement that was in place at the time of their matriculation. In case degree requirements are changed and certain courses are no longer offered, the department will try to find some compromise that allows those students to satisfy the original requirements.

Financial Matters

Sources of Financial Support

Full-time Ph.D. students in the Department of Chemistry in good standing normally receive financial support as either a teaching assistant or a research assistant, with tuition and fees included in that support package.

All graduate students receiving assistantships are expected to spend full time on their education and assigned duties and may not engage in any other activity for compensation without specific approval as outlined under ***Policies on Outside Employment*** (p. 56). Students are encouraged to take course work and pursue professional development activities appropriate to their career goals, while keeping in mind that their effort on their Chemistry Ph.D. duties needs to be maintained at a satisfactory level at the same time.

The amount of time a student spends on research depends on the amount of course work approved by the advisor, the nature of his/her financial support, and the requirements of the specific group in which he/she is working. For graduate students taking courses and/or supported as a TA, working on research should be the default work activity when not in classes or completing TA duties. As the Ph.D. requirements are completed, research becomes full-time. For PIs to remain competitive for external funding, research progress and ultimately dissemination through publications are essential. Thus, graduate students are expected to deliver their best, most efficient effort to produce results that will achieve those goals.

Research assistantships (RA) are typically funded by government agencies, private foundations or industries to a faculty member as Principal Investigator (PI), and sometimes directly to a student through a fellowship from a private foundation or a gift to the university. Students who are supported as RAs will be expected to conduct appropriate research under the direction and guidance of their research advisor(s). Students funded on research grants are responsible for prioritizing their time appropriately based on their source of support and asking their advisor any time they are unsure of these priorities. Because Department of Chemistry faculty members make every effort to help students integrate funded projects into the student's thesis, RAs are generally expected to make research effort their utmost priority.

Students are strongly encouraged to explore opportunities for **external fellowships** and discuss them with their advisors to determine whether they are currently competitive for that opportunity and, if so, how best to pursue it. Past students' awards (www.chem.cmu.edu/grad/awards/) can provide ideas for where to apply. CMU's Fellowships and Scholarships Office (www.cmu.edu/fso/) maintains a list of opportunities and you can also consult the Global Communication Center for writing consultations guidance to prepare excellent applications. Securing an external fellowship can help you to pursue your own research ideas and broaden your research experience.

Teaching assistantships (TA) are a limited departmental resource distributed to research advisors who then assign these positions to selected students. Advisors may allocate the TAs to students in their group according to the group's needs, with the limitations described under ***Time Limit on TA Support*** (p. 56). Teaching assistant duties include, but are not limited to, conducting recitation classes, teaching in laboratory classes, holding office hours and grading. Minimum English proficiency requirements must be met in order for a student to hold some teaching assistantships and the Intercultural Communication Center administers the testing for Carnegie Mellon. (See p. 27–32 for more about English Proficiency and Graduate Teaching requirements.) Students who will be TAs for the department spend on average 15–20 hours/week in their assigned duties.

To be considered full-time, students must be registered for a minimum of 36 units. Students who fail to register for at least 36 units by the 10th day of classes each semester will be administratively withdrawn and are not eligible to be paid. Building access with a CMU ID card is automatically terminated. Failure to register also jeopardizes student health insurance, student loans, and affects tuition charges for research advisors and the department.

Students who are not registered properly risk the loss of student status which is a very serious problem, particularly for students on a visa, and difficult to correct.

Students who have achieved ABD status may have the option to switch from ABD in residence status to *in absentia* (ABS) which can often allow the completion of thesis writing while employed elsewhere once experimental work is complete. Please refer to Carnegie Mellon's **Doctoral Student Status Policy** or discuss with the departmental graduate ombudsperson about details.

Time Limit on TA Support

The normal time to complete the Ph.D. is 4.5–5.5 years and financial support as a TA cannot be guaranteed beyond a student's 5th year in residence, although an advisor may provide support as a research assistant beyond the 5th year. When a student is not graduating in the 10th semester and will not be supported on RA in the 11th semester, the student and advisor must jointly petition the department head for financial support as a TA at the start of the spring semester. The petition must show a very good plan for the next 1–2 semesters with (1) the student's thesis outline and intended timeline for completing it approved by the advisory committee and (2) the advisor's plan for publishing the student's remaining work and moving him/her toward graduation. An advisor may still provide support as a research assistant beyond the 5th year without petition.

Student Health Insurance Policy Responsibilities

While the Department of Chemistry provides a supplement to students' stipends to help with the cost of required health insurance, each student is personally responsible for maintaining health insurance and paying the related costs each year. Otherwise, students may not be eligible to register or receive a stipend.

Tax Implications of Stipend Support

All stipends are federally taxable. Information about tax implications of funding can be obtained from Sharon McCarl, Associate Dean for Financial Affairs of MCS. International students may contact the Office of International Education about additional resources for special situations.

Summer Funding

Graduate student stipends are for the academic year. Summer support normally is provided from research assistantships funded by grants, etc., awarded to the faculty or fellowships/awards received directly by the student from internal or external sources. Limited exceptions may be made for summer support from the Department under some circumstances by prior arrangement with the Department Head, dependent on the available resources. In all cases, a faculty member's decision not to support one of their students during the summer must be approved by the Department Head. Due to the likelihood of summer funding on a research grant requiring 100% effort, any summer travel must be planned very carefully in consultation with the research advisor to maintain that effort.

Policies on Outside Employment

Employment outside of the research assistantship or teaching assistantship is prohibited for full-time graduate students in the Department of Chemistry during the academic year. Exceptions can jeopardize the tax status of all graduate students, and thus any opportunity must be reviewed by the Research Advisor, the Graduate Program Committee, and the Associate Dean for Administrative and Financial Affairs.

Outside employment is prohibited if summer support is provided. If summer support is not available, the student may seek outside employment with permission of his/her Research Advisory Committee.

Students who are experiencing extraordinary stress for financial reasons are strongly encouraged to reach out to the Departmental Graduate Ombudsperson.

Written Notice of Changes in Financial Support

Every effort is made to provide continuous support to students in good standing, within the limits of the available resources. The Department places a high priority on maintaining continuous financial support for graduate students, and provides notice to students on changes in their financial support, with a 6 month written notification, where possible, in the event of a change in the funding. If a student's funding is lost or reduced unexpectedly and continuous funding proves difficult to arrange, the student should first consult the Department Head.

If a student is terminated from the Ph.D. Program, the student's first notice of a possible change in financial support will normally be when he/she is initially placed on probation. The probationary period will typically last 3-4 months. If conditions for reestablishing good standing are not met within that time, a student may, depending on departmental resources and available positions, receive a terminal semester in the department with funding through a TA position during the academic year or other employment during the summer.

Additional Fellowships

Students are strongly encouraged to pursue all fellowships for which they are eligible and competitive. For example, outstanding U.S. citizens are eligible for NSF Graduate Research Fellowships during their first year of a Ph.D. program. Announcements about college and departmental fellowships and additional opportunities for current students are announced by email. You may review previous departmental awardees (www.chem.cmu.edu/grad/awards/) for ideas about fellowships for which you can apply or use the database through CMU's Fellowships and Scholarships Office: www.cmu.edu/fso/.

Attendance at Conferences

In most cases, decisions regarding the student's attendance at conferences and funding availability is at the discretion of the Research Advisor. The University provides additional sources of funding to support small travel grants from which students may apply through the Graduate Program Office for Conference Funding. Conference Funding is a funding application process provided by the Graduate Student Assembly and the Provost's Office for students, student work groups or groups to attend a conference, whether as a participant or as a presenter. The process is managed by the Office of the Assistant Vice Provost for Graduate Education. Students can find more information about the application process and deadlines at: www.cmu.edu/graduate/professional-development/conference-funding/. Please see the department web site for additional information about the department's Edwin N. Lassettre Graduate Travel Award for students in physical chemistry or chemical physics. www.chem.cmu.edu/grad/fellowships/lassettre.html

GuSH Research Funding

GuSH Research Funding is a source of small research grant funds provided by GSA and the Provost's Office and managed by the Office of the Assistant Vice Provost for Graduate Education. Students can find more information about the application process and deadlines at: www.cmu.edu/graduate/professional-development/research-funding/.

Emergency Student Loan

Graduate students who find themselves in need of immediate funds for emergency situations should contact the Office of the Dean of Student Affairs to inquire about an Emergency Student Loan.

www.studentaffairs.cmu.edu/dean/loans/

Resources for Exceptional or Challenging Situations

Graduate Ombudsperson

Rea Freeland serves as ombudsperson for graduate students to assist with difficult academic or personal situations where a confidential sounding board and/or an intermediary can be helpful. Examples of situations where students are encouraged to seek advice or assistance include:

- Difficulty in communications with advisor, particularly when those difficulties may lead to potentially changing advisors or leaving the program,
- Conflict with other group members that is difficult to resolve within the group,
- Issues related to diversity or the departmental climate for those groups who are historically underrepresented in science, or
- Personal concerns that interfere significantly with the ability to make timely progress in research or program requirements. These might be due to health, family or financial challenges.

Upon the student's request, information shared will be kept in confidence, as long as no laws require otherwise. Should help be needed from additional sources, the student would be asked before sharing confidential information.

In the event that a difficulty cannot be resolved within the department, please refer to the grievance procedures for resolving difficult matters which are available here: www.cmu.edu/graduate/policies/appeal-grievance-procedures.html.

Additionally, students may confer with the university graduate student ombudsperson, **Suzie Laurich-McIntyre**, slaurichmcintyre@cmu.edu, on issues of process or other concerns as they navigate conflicts. Suzie Laurich-McIntyre is the Assistant Vice Provost for Graduate Education.

Procedures for Changing Advisors

A student may change research advisors at any time, provided (1) a new advisor is ready to accept the student and (2) the student has not changed advisors before. Normally, the student must be in good standing in the Ph.D. program. Typical reasons for such changes are shifts in research interests away from the advisor's area or difficulties in advisor-student communication. The process of changing advisors will generally involve:

- soliciting a new advisor (typically done confidentially and with advice from the departmental ombudsperson),
- being accepted by that individual,
- determining how to discuss the desire for a change with the prior advisor,
- giving the prior advisor sufficient opportunity to discuss the situation (and potentially ways to address any concerns leading to the desire to change), and
- determining, with the prior advisor and the Department, what should be done to finish work in the former group and provide a smooth transition, similar to what would be expected leaving other types of jobs.

Students who are considering a change of advisors are encouraged to seek confidential advice on the details of these steps by consulting the Associate Head. Note that prospective advisors should generally keep discussions of change of advisor confidential until the student's decision is final and the Department Head has approved of the change. (See also: Eligibility to Change Advisors, page 50).

Appendix A

Highlighted University Resources for Graduate Students and The WORD, Student Handbook

Key Offices for Graduate Student Support

Office of the Assistant Vice Provost for Graduate Education

www.cmu.edu/graduate

grad-ed@cmu.edu

The Office of the Assistant Vice Provost for Graduate Education, AVPGE, directed by Suzie Laurich-McIntyre, Ph.D., Assistant Vice Provost for Graduate Education, provides central support for graduate students in a number of roles. These include: being an ombudsperson and resource person for graduate students as an informal advisor; resolving formal and informal graduate student appeals; informing and assisting in forming policy and procedures relevant to graduate students; and working with departments on issues related to graduate students and implementation of programs in support of graduate student development.

The Office of the AVPGE often partners with the division of Student Affairs to assist graduate students with their Carnegie Mellon experience. Senior members of the student affairs staff are assigned to each college (college liaisons) and are often consulted by the Assistant Vice Provost for Graduate Education and departments on an individual basis to respond to graduate student needs.

The Office of the Assistant Vice Provost for Graduate Education (AVPGE) offers a robust schedule of professional development opportunities. Some are geared towards a specific population (master's students, PhD students at the beginning of their program, graduate students seeking tenure track positions, etc.) and others are open to all graduate students (time management, balancing, staying healthy). A full schedule of programs can be found at: www.cmu.edu/graduate/.

The Office of the AVPGE also coordinates several funding programs, and academically focused seminars and workshops that advise, empower and help retain all graduate students, particularly graduate students of color and women in the science and technical fields. The fundamental goals of our programs have been constant: first, to support, advise and guide individual graduate students as they work to complete their degrees; second, to contribute to the greatest degree possible to the diversification of the academy. Visit the Graduate Education website for information about:

- Conference Funding Grants
- Graduate Small Project Help (GuSH) Research Funding
- Graduate Student Professional Development: seminars, workshops and resources
- Graduate Women Gatherings (GWG)
- Inter-university Graduate Students of Color Series (SOC)

Office of the Dean of Student Affairs

www.cmu.edu/student-affairs/

The Office of the Dean provides central leadership of the metacurricular experience at Carnegie Mellon. The offices that fall under the division of Student Affairs led by Vice President and Dean of Student Affairs Gina Casalegno, include (not an exhaustive list):

- Athletics
- Career and Professional Development Center
- Cohon University Center
- Counseling & Psychological Services (CaPS)
- Dining Services

- Housing Services
- Office of Community Standards and Integrity
- Office of Student Leadership, Involvement, and Civic Engagement
- University Health Services
- Wellness Initiatives

Graduate students will find the enrollment information for **Domestic Partner Registration** and **Maternity Accommodations** in the Office of the Dean of Student Affairs and on the website. The Office of the Dean of Student Affairs also manages the **Emergency Student Loan** (ESLs) process. The Emergency Student Loan service is made available through the generous gifts of alumni and friends of the university. The Emergency Student Loan is an interest-free, emergency-based loan repayable within 30 days. Loans are available to enrolled students for academic supplies, medication, food or other expenses not able to be met due to unforeseeable circumstances. The Office of Integrity and Community Standards also provides consultation, support, resources and follow-up on questions and issues of Academic Integrity: www.cmu.edu/academic-integrity.

Assistance for Individuals with Disabilities

www.cmu.edu/education-office/disability-resources/

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical and programmatic campus access to all events and information within the Carnegie Mellon community. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Sections 503 and 504 of the Rehabilitation Act of 1973. Students who would like to receive accommodations must submit a Voluntary Disclosure of Disability Form (www.cmu.edu/education-office/disability-resources/student-information-and-services/voluntary-disclosure-of-disability.pdf) to access@andrew.cmu.edu to begin the interactive accommodation process.

For more information, please see www.cmu.edu/education-office/disability-resources/. Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Catherine Getchel, 412-268-6121, getchell@cmu.edu to access the services available at the university and initiate a request for accommodations.

Eberly Center for Teaching Excellence & Educational Innovation

www.cmu.edu/teaching

Support for graduate students who are or will be teaching is provided in many departments and centrally by the Eberly Center for Teaching Excellence & Educational Innovation. The Eberly Center offers activities for current and prospective teaching assistants as well as any graduate students who wish to prepare for the teaching component of an academic career. The Center also assists departments in creating and conducting programs to meet the specific needs of students in their programs. Specific information about Eberly Center support for graduate students can be found at: www.cmu.edu/teaching/graduatestudentsupport/.

Carnegie Mellon Ethics Hotline

The health, safety and well-being of the university community are top priorities at Carnegie Mellon University. CMU provides a hotline that all members of the university community should use to confidentially report suspected unethical activity relating to financial matters, academic and student life, human relations, health and campus safety or research.

Students, faculty and staff can anonymously file a report by calling 877-700-7050 or visiting www.reportit.net (user name: tartans; password: plaid). All submissions will be reported to appropriate university personnel.

The hotline is NOT an emergency service. For emergencies, call University Police at 412-268-2323.

Graduate Student Assembly

www.cmu.edu/stugov/gsa/

The Carnegie Mellon Student Government consists of an Executive Branch and a Legislative Branch. This is the core of traditional student government, as governed by the Student Body Constitution. The Executive Branch serves the entire student body, graduate and undergraduate, and consists of one president and four vice-presidents. The Legislative Branch for graduate students, The Graduate Student Assembly (GSA) passes legislation, allocates student activities funding, advocates for legislative action locally and in Washington D.C. on behalf of graduate student issues and needs, and otherwise acts on behalf of all graduate student interests. GSA also contributes a significant amount of funding for conferences and research, available to graduate students through application processes managed by the Office of the Assistant Vice Provost for Graduate Education. GSA also plans various social opportunities for graduate students and maintains a website of graduate student resources on and off-campus, www.cmu.edu/stugov/gsa/resources/. Each department has representation on GSA and receives funding directly from GSA's use of the student activities fee for departmental activities for graduate students. The department rep(s) is the main avenue of graduate student representation of and information back to the graduate students in the department.

Intercultural Communication Center (ICC)

www.cmu.edu/icc/

The Intercultural Communication Center (ICC) is a support service offering both credit and non-credit classes, workshops, and individual appointments designed to equip nonnative English speakers (international students as well as international students who attended high school and/or undergraduate programs in the U.S.) with the skills needed to succeed in academic programs at Carnegie Mellon. In addition to developing academic literacy skills such as speaking, reading and writing, students can learn more about the culture and customs of the U.S. classroom. The ICC also helps international teaching assistants (ITAs) who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon and provides ITA testing, required testing indicating a nonnative speaking student has a language proficiency required before being allowed to work with undergraduates in classes, labs or individual meetings.

Office of International Education (OIE)

www.cmu.edu/oie/

Carnegie Mellon hosts international graduate and undergraduate students who come from more than 90 countries. Office of International Education (OIE) is the liaison to the University for all non-immigrant students and scholars. OIE provides many services including: advising on personal, immigration, academic, social and acculturation issues; presenting programs of interest such as international career workshops, tax workshops, and cross-cultural and immigration workshops; supporting international and cultural student groups such as the International Student Union and the International Spouses and Partners Organization; maintaining a resource library that includes information on cultural adjustment, international education and statistics on international students in the United States; posting pertinent information to students through email and the OIE website, and conducting orientation programs.

Veterans and Military Community

www.cmu.edu/veterans/

Military veterans are a vital part of the Carnegie Mellon University community. Graduate students can find information on applying veteran education benefits, campus services, veteran's groups at CMU, non-educational resources and international military service information through the Veterans and Military Community website. There are also links and connections to veteran resource in the Pittsburgh community. The Naval ROTC and Veteran Affairs Offices are located at 4615 Forbes Avenue, uro-vaedbenefits@andrew.cmu.edu, 412-268-8747.

Key Offices for Academic & Research Support

Computing and Information Resources

www.cmu.edu/computing

Computing Services provides a comprehensive computing environment at Carnegie Mellon. Graduate students should seek Computing Services for information and assistance with your Andrew account, network access, computing off-campus, campus licensed software, email, calendar, mobile devices, computer security, cluster services and printing. Computing Services can be reached at it-help@cmu.edu.

The Carnegie Mellon Computing Policy establishes guidelines and expectations for the use of computing, telephone and information resources on campus. The policy is supported by a number of guidelines graduate students should know. The policy and guidelines are available at: www.cmu.edu/computing/guideline/.

Research at CMU

www.cmu.edu/research/index.shtml

The primary purpose of research at the university is the advancement of knowledge in all fields in which the university is active. Research is regarded as one of the university's major contributions to society and as an essential element in education, particularly at the graduate level and in faculty development. Research activities are governed by several university policies. Guidance and more general information is found by visiting the Research at Carnegie Mellon website.

Office of Research Integrity & Compliance

www.cmu.edu/research-compliance/

The Office of Research Integrity & Compliance (ORIC) is designed to support research at Carnegie Mellon University. The staff work with researchers to ensure research is conducted with integrity and in accordance with federal and Pennsylvania regulation. ORIC assists researchers with human subject research, conflicts of interest, responsible conduct of research, export controls, intellectual property rights and regulations, and institutional animal care & use. ORIC also consults on, advises about and handles allegations of research misconduct.

Key Offices for Health, Wellness & Safety

Counseling & Psychological Services

www.cmu.edu/counseling

Counseling & Psychological Services (CaPS) affords the opportunity for students to talk privately about issues that are significant for them in a safe, confidential setting. Students sometimes feel confused about why they are feeling upset and perhaps confused about how to deal with it. An initial consultation with a CaPS therapist will clarify options and provide a recommendation to the appropriate mental health resource at Carnegie Mellon or the larger Pittsburgh community. CaPS services are provided at no cost. Appointments can be made in person or by telephone, 412-268-2922.

Health Services

www.cmu.edu/HealthServices/

University Health Services (UHS) is staffed by physicians, advanced practice clinicians and registered nurses who provide general medical care, allergy injections, first aid, gynecological care and contraception as well as on-site pharmaceuticals. The CMU student insurance plan covers most visit fees to see the physicians and advanced practice clinicians & nurse visits. Fees for prescription medications, laboratory tests, diagnostic procedures and referral to the emergency room or specialists are the student's responsibility and students should review the UHS website and their insurance plan for detailed information about the university health insurance requirement and fees. UHS also has a

registered dietician and health promotion specialists on staff to assist students in addressing nutrition, drug and alcohol and other healthy lifestyle issues. In addition to providing direct health care, UHS administers the Student Health Insurance Program. The Student Health Insurance plan offers a high level of coverage in a wide network of health care providers and hospitals. Graduate students should contact UHS to discuss options for health insurance for spouses, domestic partners and dependents. Appointments can be made by visiting UHS's website or by telephone, 412-268-2157.

Campus Wellness

www.cmu.edu/student-affairs/wellness/

At the university, we believe our individual and collective well-being is rooted in healthy connections to each other and to campus resources. There are a wide variety of resources, opportunities and people that help students thrive inside and outside the classroom. The BeWell@CMU e-newsletter seeks to be a comprehensive resource for CMU regarding all wellness-inspired events, announcements and professional and personal development opportunities. To sign up for the e-newsletter, text BEWELLATCMU to 22828 and share your preferred email address.

University Police

www.cmu.edu/police/

412-268-2323 (emergency only), 412-268-6232 (non-emergency)

The University Police Department is located at 300 South Craig Street, Room 199 (entrance is on Filmore Street). The department's services include police patrols and call response, criminal investigations, shuttle and escort services, fixed officer and foot officer patrols, event security, and crime prevention and education programming. Visit the department's website for additional information about the staff, escort and shuttle, emergency phone locations, crime prevention, lost and found, finger print services, and annual statistic reports.

SHUTTLE AND ESCORT SERVICES

University Police coordinates the Shuttle Service and Escort Service provided for CMU students, faculty, and community. Full information about these services, stops, routes, tracking and schedules can be found online at: www.cmu.edu/police/shuttleandescort/

Carnegie Mellon University publishes an annual campus security and fire safety report describing the university's security, alcohol and drug, sexual assault, and fire safety policies and containing statistics about the number and type of crimes committed on the campus and the number and cause of fires in campus residence facilities during the preceding three years. Graduate students can obtain a copy by contacting the University Police Department at 412-268-6232. The annual security and fire safety report is also available online at www.cmu.edu/police/annualreports.

The WORD

www.cmu.edu/student-affairs/theword/

The WORD is Carnegie Mellon University's student on-line handbook and is considered a supplement to the department (and sometimes college) handbook. The WORD contains campus resources and opportunities, academic policy information and resources, community standards information and resources. It is designed to provide all students with the tools, guidance, and insights to help you achieve your full potential as a member of the Carnegie Mellon community. Information about the following is included in The WORD (not an exhaustive list) and graduate students are encouraged to bookmark this site and refer to it often. University policies can also be found in full text at: www.cmu.edu/policies/.

- Carnegie Mellon Vision, Mission
- Carnegie Code
- Academic Standards, Policies and Procedures
 - Educational Goals
 - Academic and Individual Freedom
 - Statement on Academic Integrity
 - Standards for Academic & Creative Life
- Assistance for Individuals with Disabilities
- Master's Student Statute of Limitations
- Conduct of Classes
- Copyright Policy
- Cross-college & University Registration
- Doctoral Student Status Policy
- Evaluation & Certification of English Fluency for Instructors
- Final Exams for Graduate Courses
- Grading Policies
- Intellectual Property Policy
- Privacy Rights of Students
 - Research
 - Human Subjects in Research
- Office of Research Integrity & Compliance
- Office of Sponsored Programs
- Policy for Handling Alleged Misconduct of Research
- Policy on Restricted Research
- Student's Rights
- Tax Status of Graduate Student Awards

- Campus Resources & Opportunities
 - Alumni Relations
- Assistance for Individuals with Disabilities
 - Athletics, Physical Fitness & Recreation
 - Carnegie Mellon ID Cards and Services
- Cohon University Center
 - Copying, Printing & Mailing
 - Division of Student Affairs
 - Domestic Partner Registration
 - Emergency Student Loan Program
 - Gender Programs & Resources
 - Health Services
 - Dining Services
 - The HUB Student Services Center
- ID Card Services
- Leonard Gelfand Center
 - LGBTQ Resources
- Multicultural and Diversity Initiatives
 - Opportunities for Involvement
 - Parking and Transportation Services

- SafeWalk
- Survivor Support Network
- Shuttle and Escort Services
- Spiritual Development
- University Police
- Student Activities
- University Stores

Community Standards, Policies and Procedures

- Alcohol and Drugs Policy
- AIDS Policy
- Bicycle/Wheeled Transportation Policy
- Damage to Carnegie Mellon Property
- Deadly Weapons
- Discriminatory Harassment
- Disorderly Conduct
- Equal Opportunity/Affirmative Action Policy
- Freedom of Expression Policy
- Health Insurance Policy
- Immunization Policy
- Missing Student Protocol
- Non-Discrimination Policy
- On-Campus Emergencies
- Pets
- Political Activities
- Recycling Policy
- Riotous and Disorderly Behavior
- Safety Hazards
- Scheduling and Use of University Facilities
- Sexual Harassment and Sexual Assault Policy
- Smoking Policy
- Student Accounts Receivable and Collection Policy and Procedures
- Student Activities Fee
- Student Enterprises
- Workplace Threats and Violence Policy