Handbook
for the
PhD Graduate Program in Chemistry
at Brandeis University

2024-2025 Academic Year

The purpose of this handbook is to help students navigate the various requirements and expectations of the Graduate Program in Chemistry.

If you have questions or need help, please contact any of the following people:

Chemistry Department Chair:
Prof. Thomas Pochapsky, Rosenstiel 655, pochapsk@brandeis.edu, ext. 6-2559

Graduate Studies Committee Chair and Director of Graduate Studies:
Prof. Klaus Schmidt-Rohr, Edison-Lecks 118a, srohr@brandeis.edu, ext. 6-2520

Graduate Admissions Committee Chair:
Professor Grace Han, Edison-Lecks 307, gracehan@brandeis.edu, 6-2576

Graduate Affairs Office: Ros/Kos 3-RK02, scigradoffice@brandeis.edu, 6-2300
Maryanna Aldrich, Ros/Kos 3-RK02, maldrich@brandeis.edu, 6-4850
Anne Lazerson, Ros/Kos 3-RK02, lazerson@brandeis.edu, 6-2327

Chemistry Office: Edison-Lecks 211, chemofc@brandeis.edu, 6-2500
Courtney Maurer, Edison-Lecks 212a, cmaurer16@brandeis.edu, 6-2501
Maria Berlis, Edison-Lecks 211, mariaberlis@brandeis.edu, 6-2500

Chemistry Graduate Department Representatives:
Anant Bhasin, anantbhasin@brandeis.edu
Zixiang Jiang, zixiangjiang@brandeis.edu

The purpose of this handbook is to provide more programmatic details than are included in the Chemistry Bulletin for the PhD program. Please make sure you read the Bulletin carefully:

- GSAS: https://www.brandeis.edu/registrar/bulletin/provisional/gsas.html
- Chemistry: https://www.brandeis.edu/registrar/bulletin/provisional/courses/subjects/1000.html

Please be aware that the University Bulletin is a legal document governing all academic regulations. If anything in this handbook contradicts the Bulletin, the Bulletin will take precedence. In addition, please be aware that in the event of a public health emergency or other major event, the procedures listed in this handbook may change.

This handbook will answer many of your questions. Further questions about the graduate curriculum and requirements should be directed to the Graduate Studies Committee Chair, Klaus Schmidt-Rohr. For non-academic matters the Chemistry Department Operations Administrator, Courtney Maurer, and the Department Coordinator, Maria Berlis, may be able to help you. For academic paperwork and stipend information, see the Grad Affairs Office Academic Administrator, Anne Lazerson. For questions and concerns about the program, you may also contact the Graduate Department Representatives, currently Anant Bhasin and Zixiang Jiang.

Additional resources for graduate students are provided in Appendix O at the end of this document.

Degree requirements -- General Information

To obtain the PhD degree, students must satisfy both the general requirements of the graduate school and the specific requirements of the Chemistry Graduate Program. Both sets of requirements are summarized in the Brandeis catalog:
http://www.brandeis.edu/registrar/bulletin/

The following sections contain additional details about the program requirements. The student is responsible for fulfilling each requirement before the relevant deadline. Students failing to complete requirements on time may, at the discretion of the faculty, be required to leave the Program.

Students in the Chemistry Graduate Program are expected to work full-time towards the degree throughout the entire calendar year, including the summer. Vacations and other absences must be approved by the student's advisor. Students may take up to three weeks (15 working days) of paid vacation per year. Presence in the laboratory is optional on staff holidays (https://www.brandeis.edu/human-resources/2024-holiday-schedule.html), except for single President's Discretionary Days or when classes are in session.

Summary of requirements for advancing to candidacy in the PhD program:

All chemistry students must demonstrate breadth of knowledge by (a) passing placement exams in physical, organic, and inorganic chemistry or taking courses in these areas; (b) take at least six lecture courses with grades of B- or better and a GPA of 3.0 or better from at least two of the following five areas: inorganic, materials, organic, and physical chemistry and chemical biology; (c) selecting a thesis lab by mutual agreement with a faculty member by the end of the first year; (d) passing a qualifying exam specific to their area of study; and (e) teaching for at least two semesters. In addition, graduate students must register for, attend, and participate in

the CHEM 300 colloquium every semester, the relevant chemistry seminar (CHEM 230 or CHEM 240) every year (typically in the Spring semester), and the program on Responsible Conduct of Science (CONT 300, a not-for-credit course, or the equivalent Research Ethics Workshop) in the first and fifth year. In the second and all subsequent years, students must also register for their advisor's section of Dissertation Research (CHEM 401D).

Student trajectories and progress will be determined in a series of in-person meetings with the Graduate Studies Committee (GSC), which normally includes at least one member from of the principal specialties in the department. The GSC will provide academic guidance and support for first-year students. The Chair of the GSC is also the Director of Graduate Studies (DGS) and acts as the academic advisor until the student has a research advisor. During their first year, all students will meet with the GSC three times; those who are still completing coursework in year two will be required to have a fourth meeting with the committee.

Readmission to the PhD degree program at the end of the first year will be based on the student's record in course work and performance on the placement examinations. Further progress will be evaluated on a yearly basis by the GSC, the student's advisor, and the thesis advisory committee in years three and later.

1. Graduate Studies Committee Meetings

Students will be required to formally meet with the Graduate Studies Committee (GSC) three or four times throughout their first few semesters for guidance and approval of program requirements. In all cases, after having been consulted about their schedule the student will be assigned a specific meeting time that they must attend. The general meeting times and topics are listed below.

A. Meeting just before the start of the first semester:
   - In advance of this meeting, students will fill out and return Appendix A (*Incoming Doctoral Student Advising Data)*, which lists at least three courses that the student hopes to take in their first semester and at least three faculty members with whom the student plans to discuss research.
   - In the meeting, performance on placement exams will be reviewed. Based on this and on the student's research interests, the committee will determine which courses the student should enroll in and take, or enroll in and 'shop'.
   - The process of choosing an advisor will be discussed and students will be given Appendix B (*Choosing a Research Supervisor and Advisor Exploration Form*), on which they will note which faculty they meet with to discuss research.

B. Meeting in late October shortly before the start of pre-enrollment for the 2nd semester:
   - In advance of this meeting, students will fill out and return Appendix C (*Mid-First Semester Doctoral Student Advising Data*), which lists at least three courses that the student hopes to take in their second semester and the three or more faculty members with whom the student has already discussed research.

- The student will bring the *Advisor Exploration Form* (Appendix B) with at least three faculty signatures to the meeting and submit it to the committee, or, if additional research discussions are planned, later to the Graduate Affairs Office.
- The committee will discuss the student's progress in courses thus far in the semester.
- Progress towards choosing an advisor will be discussed and students will be given Appendix D (*Advisor Choice Form*). This form must be returned to the Graduate Affairs Office once an advisor choice has been made.
- The committee will review the second semester courses that the student wishes to take in light of their research plans and determine which courses the student should enroll in and take, or enroll in and shop.
- The committee will discuss the student's intended specialty and the appropriate seminar course (CHEM 230 or 240) that the student should enroll and participate in. There will also be a discussion of any specific elements of the specialty.

C. Meeting just before the start of the second semester:
- Before this meeting, students will be informed in writing of any deficiencies in their first semester performance.
- Discussion of second placement exam results, if applicable.
- The committee will review the student's first semester performance in courses, teaching, ESL (if applicable), and the student's progress towards choosing an advisor.
- The committee will review pre-enrollment and determine which courses the student should enroll in and take, or enroll in and shop. Depending on final Fall semester performance and lab choice, there may be a change in the plan that was determined in the second GSC meeting.
- Specific elements of their specialty will be discussed if needed.
- Students who have taken graduate-level chemistry courses after receiving a bachelor's degree may discuss transfer credits as outlined in Appendix E (*Transfer or Course Credit*).

D. At the end of the second semester:
Students who have at least a B average, and have passed six courses (of which one may be CHEM 200) with a B- or better grade, are in good standing. The GSC informs students who are in good standing in writing that they have been readmitted.

Students whose average is below a B or who received a failing grade of C+ or below are not in good standing. The GSC informs them in writing either that
(i) they have been readmitted on the condition that specific deficiencies are corrected, or that
(ii) the student will not be readmitted and must leave the program, with an MA degree if all the requirements for that degree have been fulfilled.

E. Students who have not completed the six lecture course requirements in their first year meet with the GSC and their advisor just before the third semester starts. The GSC, advisor, and student will establish and sign the Appendix F contract (*Program of student beyond 2nd*

graduate semester). This form is not needed for students who have completed the required course work in their first year.

2. Placement Exams and Courses

Each student is expected to demonstrate a satisfactory knowledge of undergraduate chemistry in placement examinations in physical, organic, and inorganic chemistry. These examinations are given twice a year, before the start of each term (typically mid-August and early January). The results of these examinations will influence the student's initial program of course work and will be considered by the graduate studies committee in evaluating the student's progress. If a student fails to pass a placement examination, a graduate course in that area of chemistry must be passed before the end of the second year. Courses appropriate for this purpose are listed in Appendix N.

A balanced program of study will be prepared by the student and the graduate studies committee. In general, students will be required to pass with a grade of B- or better a minimum of six graduate-level lecture courses (100 or above) with a GPA of 3.0 or better from at least two of the following five areas: inorganic, materials, organic, and physical chemistry and chemical biology. In addition, all students are required to participate regularly in both colloquium and seminar, and take the program on Responsible Conduct of Science (CONT 300, a not-for-credit course, or the equivalent Research Ethics Workshop) normally during their first year and every four years thereafter. Students are required to register for colloquium, CHEM 300, every semester and register for seminar, either CHEM 230 (chemical biology/inorganic/organic) or CHEM 240 (biophysical/materials/physical) whenever offered, typically in the Spring.

After their first year, students may occasionally take an additional course related to their research interests or career plans, with written approval from their PhD advisor. If possible, such plans should be discussed with the Thesis Advisory Committee in the context of the student's Individual Development Plan.

The following is a typical program of study (assuming a starting term of Fall):

<u>Year 1, Fall Semester</u>

Three graduate* level science courses, approved by the GSC

CHEM 300 Colloquium

* In exceptional cases, the GSC may approve a student to take an undergraduate level course and will assist the student with the petition to the Registrar for graduate credit.

<u>Year 1, Spring Semester</u>

Two* or three graduate level science courses, approved by the GSC

Responsible Conduct of Science (CONT 300, a not-for-credit course, or the equivalent Research Ethics Workshop)

CHEM 300 Colloquium

CHEM 230 or 240 Seminar, approved by the GSC and based on specialty of study
*With approval from the GSC, students may take their advisor's section of CHEM 200, Advanced Chemistry Laboratory, in their second semester and defer their final course to their second year.

Year 1, Summer Term

Each summer, all students will be automatically registered for CONT 250 (Summer Research).

Year 2, Fall semester

CHEM 300 Colloquium

CHEM 401 Dissertation Research

* A final course, if one was deferred to the Fall of the second year.

Year 2, Spring semester

CHEM 230 or 240 Seminar, based on specialty of study

CHEM 300 Colloquium

CHEM 401 Dissertation Research

*Final course, if one was deferred to the Spring of the second year.

Years 3 and beyond, Fall semester

CHEM 300 Colloquium

CHEM 401 Dissertation Research

Years 3 and beyond, Spring semester

CHEM 230 or 240 Seminar, based on specialty of study

CHEM 300 Colloquium

CHEM 401 Dissertation Research

Year 5

Additionally, CONT 300 Responsible Conduct of Research, or the equivalent Research Ethics Workshop

3. Choosing a Research Supervisor

Choosing a research supervisor is an important part of your first semester of graduate school. We ask that you meet with at least three professors early in the semester to hear about their research. Some students may have focused on a particular advisor even before arriving here, while others will want to explore various options after arriving. In any case, we consider it essential that you talk to a minimum of three potential advisors before you choose one. You should also talk with more advanced graduate students and attend group meetings of the research groups you are considering. This will be the best time for you to obtain a broad exposure to the research activities in the Department.

As soon as you have identified the professors whose research interests best match yours, you should set up appointments with them, for instance by email, to discuss their program. Most faculty members expect to be approached by students interested in hearing about their research. While some professors may seek you out, many will wait patiently for your visit. This does not mean that they are not interested in having you as a group member!

As you visit faculty members, please take the second page of Appendix B, given to you in your August GSC meeting, with you for them to sign. The top part of this form must be completed before your October meeting with the Graduate Studies Committee. Please bring it with you at that time.

Students will also will complete two desk rotations before joining a research group. The goal of these rotations is to expose students to different group cultures, expertise in the department, and foster inter-group collaborations in future years. The first rotation will be in the student's first-choice group and last for five weeks. The second rotation will last three weeks and be in either a student's second-choice group, or a group they hope to collaborate with during the course of their PhD. During these rotations, the student is expected to attend group meetings (class and teaching schedule allowing), meet with students and the PI, and learn about motivation, techniques, and approaches unique to a given lab. Each lab will provide the student with a desk where they can sit, do work, and spend time with the group. Students should see these rotations as opportunities to integrate into the department, learn more about a group before officially joining, and build bridges across the department. We encourage students to ask questions about PI mentorship style, collaboration structure, graduation expectations, and lab environment. Our hope is these rotations will empower students to make informed group choices, foster collaboration, and enhance department cohesion.

It is expected that students will choose a research adviser during the first year, ideally by the end of the first semester.

Your choice of advisor will help determine your specialty of study, which will determine which Chem 230 or 240 specialty seminar you will take in your Spring semesters and which specialty you will take your qualifying exams and make oral presentations in. Students' specialization will usually be the same as their advisor's, but can be otherwise if there is a good reason. For instance, a student with a strong organic background performing synthesis in a materials chemistry research group could enroll in CHEM 230.

4. Library and Safety Training Requirements

All graduate students are required to complete a designated library training program in their first year. This is generally completed in early January, before the start of the second semester.

Students working in wet labs as teaching assistants or for their research must go through safety training before they are allowed to enter the teaching or research labs. This is done

with a mix of in-person and online Traincaster training. More information can be found at https://www.brandeis.edu/ehs/labs/.

5. Qualifying Examinations

The graduate student must demonstrate proficiency in their major field by passing the qualifying exam in that specialty. Students in all fields must maintain satisfactory progress by passing these examinations. This exam is generally completed during the third and fourth semesters of graduate work. Detailed guidelines are provided in Appendix G (*Biophysical/Material/Physical Chemistry Qualifying Exam*) for biophysical/materials/physical students and in Appendix H (*Organic/Chemical Biology Qualifying Exam*) for organic/chemical biology students. Note that some students are expected to submit a written analysis before the start of the third semester.

6. Colloquium and Seminar

Each student in residence is required to attend and participate in the departmental colloquium (CHEM 300) every semester and the seminar (CHEM 230 or CHEM 240) in their chosen specialty every semester (usually Spring) in which it is offered.

Organic and chemical biology students present their first seminar in CHEM 230 in their second year. The presentation schedule will be set by the Graduate Affairs Office. Their second seminar is a required public seminar preceding the oral dissertation defense.

Guidelines for the second year seminar are given in Appendix I (*Guidelines for Chemical Biology/Inorganic/Organic Seminars*). In advance of the seminars, students will be given a list of topics that have been used recently - these topics must be avoided. Each speaker should select a topic, which must be approved at least four weeks in advance of the seminar by their research advisor via the *Organic Chemistry and Chemical Biology Seminar Approval Form* (see Appendix J). This form must be returned to the Graduate Affairs Office no later than four weeks before the seminar. The Graduate Affairs Office must be given the title of the talk at least two weeks in advance so that flyers announcing the talk can be prepared and posted. The speaker should prepare a short summary of the talk for distribution to the faculty and organic/inorganic students, at least one week in advance of the seminar; a bibliography of leading references should be included.

Physical/Material/Biophysical students are required to give two seminars in CHEM 240, one in the second year and one in the third year. In addition, the dissertation defense is required to be public and open to faculty engaged in graduate instruction and invited faculty members from other institutions.

Guidelines for the second- and third-year seminars are given in Appendix K (*Guidelines and Deadlines for Presenters of Physical/Biophysical/Material Chemistry Seminars*). At least 3 weeks prior to the seminar date the student must provide the faculty member organizing the physical/biophysical/materials seminars and their research advisor with a draft of the title and a short, one-paragraph abstract. At least 2 weeks prior to the seminar date, the student must

provide the faculty member organizing the physical/biophysical/materials seminars and their research advisor with (1) a final copy of the approved title and abstract, and (2) a tentative outline of the talk (e.g., a list of slide titles). The final copy of the approved title and abstract should also be provided to the Graduate Affairs Office for the departmental record and for posting notices.

7. Annual Progress Review

Each summer, student progress will be evaluated, and students will receive a Progress Letter from the Graduate Studies Committee Chair. If the student has not completed a requirement, this will be noted in the letter, along with a suggested timeline for completion.

At the end of the second year, the student meets with their advisor to discuss progress, which is summarized in a document prepared and signed by the advisor. The student must also sign the document to indicate that they have seen it. If the student disagrees with the assessment, they must still sign, but are free to indicate what they disagree with. The signed document (there is no specific form) must be returned to the Graduate Affairs Office before the student can be reappointed for the third year.

The following are minimum criteria for a student to be in good academic standing with the Graduate School:

- All grades in classes that count towards the degree are a B- or above, with a GPA of 3.0 or better. If classes in a program are credit/no credit, the student must have received credit for all classes that count towards the degree. The student has no unresolved Excused Incompletes (EIs) in spring, summer or fall courses that count towards the degree.
- The student is completing non-course milestones (i.e., qualifying exams, seminar presentations, research progress, etc.) on the program's typical timeline and is also taking courses as expected.

Annual Thesis Progress Meetings:

Thesis Advisory Committee. The Thesis Advisory Committee comprises the thesis supervisor and at least two other faculty members chosen by the student. At least one of the other faculty members must be a member of the Chemistry Department.

Annual thesis progress meetings. Starting in the third year of study, the student will meet with their Thesis Advisory Committee at least once every academic year to discuss progress towards completing thesis research and writing the dissertation. For the first meeting, the student submits a written description of the general aims of the thesis research project and the progress made towards these aims. For subsequent meetings, the student submits an update that includes a rationale for any changes in aims, a description of progress, and a list of any presentations or publications. Full details are provided in Appendix L, *Annual Thesis Progress Meetings*. These meetings need to be arranged by the student, and the student brings along the form required for committee members to record comments and recommendations (see Appendix M, *Annual Progress Meeting Form*). Before meeting with their Thesis Advisory Committee, the student needs to prepare or update their Individual Development Plan (IDP),

for instance using the form provided by the Department (see Appendix P, *Individual Development Plan*), in preparation for discussing the IDP with the committee.

8. Teaching Requirement

The Chemistry PhD program requires students to serve as teaching assistants (TAs). Because individual TA assignments differ in workload, this requirement is calculated in TA units. Students will be required to complete assignments equivalent to a total of 10 TA units. TA assignments at 10 hours per week for one semester count as 1 unit, TA assignments that require TAs to work up to 15 hours per week in a semester will count as 1.5 units. Assignments with an expectation of <10 hours per week will count as 0.75 TA units (these positions were previously titled "Graders", though students should note that in a 0.75 TA unit position some contact with students may be required). At the discretion of the chemistry program, students may receive waivers up to 8.5 units towards their requirement of 10 TA units.

In the first year, all graduate students teach sections of laboratory classes, lecture recitations, or assist faculty (for instance with grading) with an assignment of 0.75 TA units. In subsequent years, students are teaching or research assistants depending on departmental needs and availability of funding. Teaching assistant (TA) assignments are made in the summer (for Fall teaching) and in the Fall (for Spring teaching) prior to the commencement of teaching responsibilities.

Graduate teaching assistants and faculty members will discuss course requirements, attendance policies and the range of graduate responsibilities (e.g. in class or lab, outside class or lab, administrative duties, technical assistance). Students serving as teaching assistants must attend any training required by the Graduate School (including Title IX training) and by the instructor teaching the course they are to assist.

Students are expected to take their teaching responsibilities seriously, and successful completion of this teaching is a program requirement.

All PhD students who are teaching assistants are members of the Graduate Student Union, SEIU Local 509. We encourage you to review the Union Contract if you have questions.

9. Residence

The minimum residence requirement for the PhD degree is three years. Completion of the PhD by the end of the fifth year is considered ideal.

10. Dissertation

A written dissertation is required that describes the results of an original investigation and demonstrates the competence of the candidate in independent investigation, critical ability, and effectiveness of expression. Students need to follow the Graduate School's dissertation guidelines (see https://www.brandeis.edu/gsas/student-resources/thesis-dissertation-guide.html). Additional specific PhD dissertation requirements are set by the student's advisor and the dissertation committee. Students in the organic and inorganic programs must give a

public seminar on the dissertation research. The student must successfully defend the dissertation in a final oral examination. The dissertation and defense committee will be composed of at least three faculty members. Two of the committee members must come from the Chemistry Department and one must be tenured. One of the members of the defense committee must be chosen from outside the Chemistry Department (and often from outside the University), in consultation with the student's supervisor several months in advance of the defense. Typically, some or all of the Thesis Advisory Committee members continue as dissertation and defense committee members. The student must provide each committee member with a copy of the dissertation, along with an abstract of no more than 350 words, at least two weeks before the defense.

Students have not fulfilled the dissertation requirement until the final version of the dissertation, including any changes required by the committee and the Graduate School, is submitted to and accepted by the Graduate School.

Chemistry PhD with Specialization in Quantitative Biology (QB)

Students wishing to obtain the specialization must first gain approval of both the graduate studies committee and the quantitative biology (QB) program chair (Prof. Jané Kondev or Prof. Paul Garrity). This should be done as early as possible; ideally, during the first year of graduate studies. For information on how to apply to the QB program, see: http://www.brandeis.edu/programs/quantbio/application.html

To receive the PhD in chemistry with additional specialization in quantitative biology, candidates must:

A. Complete the requirements for the Chemistry PhD described above.

B. Complete the course requirements of the quantitative biology specialization as outlined in that section of the *Bulletin*.

Any alteration to the quantitative biology course requirements must be approved by both the graduate studies committee and by the quantitative biology program faculty advisory committee. With the approval of the director of graduate studies, courses taken to satisfy the QB specialization requirements can be used to satisfy course requirements of the Chemistry PhD degree.

Yearly Timelines

The timelines below are for students with a Fall semester start.

Year 1: The first year is devoted to building a strong academic foundation, selecting a research advisor, and by summer, engaging in research.

August:

• Students' first GSC meeting takes place before classes start. Prior to the GSC meeting, students complete the Incoming Doctoral Student Advising Data Form on faculty with

whom they are interested in discussing research opportunities as well as Fall semester courses of interest.

• Placement exams occur during orientation.

• After the GSC meeting, students register for the Fall semester courses approved by the GSC, including any classes they will 'shop'. Students need to be enrolled in at least twelve credits to be in full-time status.

• Teaching Assistant assignments for the Fall are finalized during orientation shortly before the Fall semester begins. All first-year students are expected to attend the training required by the Graduate School for TAs. Students who will serve as TAs for the Fall semester also need to attend training required by the instructor teaching the course they will assist.

September:

• Students begin the process for choosing a research supervisor. Choosing from the faculty listed on the Advisor Exploration Form, read through their group websites and research summaries online. Start scheduling visits with at least three professors to learn more about their research, choosing from faculty listed on the Advisor Exploration Form. Review Appendix B (*Advisor Exploration Form*) for more information. Students will also participate in two desk rotations starting in September before joining a research group.

October:

• Prior to the GSC meeting in late October, students complete the Mid-First Semester Doctoral Student Advising Data Form, providing an update on their advisor exploration and Spring semester courses they are interested in taking.

November/December:

• Students are expected to choose their research advisor by the end of the Fall semester. Use these months to finish meeting with faculty, attending group meetings, etc. When students have finalized their choices, they complete Appendix D (*the Advisor Choice Form*).

• When pre-registration opens for the Spring semester, students should register for the courses discussed during their second GSC meeting. Students will have a chance to review and update their course plans at the January GSC meeting and make any adjustments to Spring registration accordingly.

January:

• Before Spring semester classes begin, students are required to attend some pre-class activities, including a library training specific to chemistry students as well as their third GSC meeting. These pre-class activities usually take place the week before classes begin. Placement exams are typically offered at this time for students who wish to re-take any exams.

• TA assignments for the Spring are finalized shortly before the semester starts.

• Research typically begins part-time during the Spring semester.

Summer 1

All students will be automatically registered for CONT 250 (Summer Research) and move to full time research for the summer term.

Qualifying exams: Starting in early summer, students begin preparing for their qualifying exams.

Physical/Biophysical/Material Chemistry Qualifying Exam: The faculty member overseeing this qualifying exam will assign an exam committee for each student in early summer. Students choose between the research-focused one-part and the literature-based two-part qualifying exam, starting with a conversation with their research advisor in June and submitting their selection to the Graduate Administration Office by the end of June. If a student chooses the two-part qualifying exam, the written analysis in Part I must be submitted to the student's committee by the end of summer, typically by August 31. Students are expected to defend their analysis in an oral exam one to three weeks after submitting their written analysis for Part I. Students who choose the one-part research-focused qualifying exam work on obtaining research results at this time. For more details, see Appendix G (*Physical/Biophysical/Material Chemistry Qualifying Exam*).

Organic/Chemical Biology Qualifying Exam: The rotating division chair will assign a committee of two faculty in the field of the student (who are not the student's research advisor) by the beginning of the third semester. For more details, see Appendix H (Organic Chemistry/Chemical Biology Qualifying Exam)

Students who did not complete the six lecture course requirements in their first year meet with the GSC and their advisor just before the third semester starts. The GSC, advisor, and student will establish and sign the Appendix F contract (*Program of student beyond 2nd graduate semester*).

Year 2: Completing remaining coursework, qualifying exams, and seminar presentations

Coursework: Students should finish any remaining required coursework in their second year.

Physical/Biophysical/Material Chemistry Qualifying Exam: Students who chose the two-part track are expected to defend their Part I written analysis in early Fall, and then begin working on Part II. Students are generally expected to submit Part II early enough to allow a defense to be scheduled before the end of the Fall semester. Students who chose the one-part research focused qualifying exam adhere to the following Organic/Chemical Biology deadlines and rules.

Organic/Chemical Biology Qualifying Exam: By **September 30**, the student and advisor meet to discuss progress toward the qualifying exam; the assessment is put in writing and shared with the rotating division chair and the DGS by September 30. By November 1, the student submits to the advisor a complete draft of the qualifier documents detailing their research project plan and progress. The adviser will provide the student with detailed feedback within 2 weeks. The student will then submit the

final draft to the exam committee by December 1 and defend it by January 15. For more details, see Appendix H.

Seminar Presentations: Students must give a seminar in CHEM 230 or CHEM 240 in their second year. Guidelines for the second year seminar are given in Appendix I (*Guidelines for Chemical Biology/Inorganic/Organic Seminars) and* Appendix K (*Guidelines and Deadlines for Presenters of Physical/Biophysical/Material Chemistry Seminars*).

Annual Progress Meeting: Each student in the second year is evaluated by their advisor before the end of May. The advisor prepares a memo in advance, reviewing the student's progress in research, the strength in the student's professional development, as well as areas which may need improvement. The advisor then orally communicates the memo to the student, clarifying the points made in the memo as necessary. At the end of this interview, the student receives a copy of this memo, and signs another copy acknowledging receipt of the review. The signed copy is submitted to the DivSci Graduate Affairs Office.

Summer 2 (and all future summers)

All students will be automatically registered for CONT 250 (Summer Research) and engage in full-time research.

Year 3: Thesis research, seminar presentation (for some students), and Thesis Advisory Committees

Thesis Advisory Committees: Starting in the third year, a student's progress toward the PhD is to be followed and encouraged by a Thesis Advisory Committee. The Thesis Advisory Committee is composed of three faculty members, including the thesis supervisor. The student chooses the other two faculty members; at least one must be a member of the Chemistry Department. The deadline to form the committee is typically January 31st (i.e., around the start of the sixth semester). Students must have their first meeting with their committee during their sixth semester, typically by the end of April.

Physical/Material/Biophysical Seminar Presentations: Students in one of these specialties are required to give a seminar in CHEM 240 in their third year. See Appendix K (*Guidelines and Deadlines for Presenters of Physical/Biophysical/Material Chemistry Seminars*) for more details.

Year 4 and higher: Thesis research and annual progress meeting with Thesis Advisory Committee.

Appendix A

Incoming Doctoral Student Advising Data

In order to help address your interests, the Graduate Studies Committee would like to have the following further information in advance of its first meeting with you.

Name: _____

Professors with whom you are most likely to discuss thesis research possibilities (a total of at least three, including those already listed from your admissions application):

_____

_____

_____

_____

_____

_____

Graduate courses (in chemistry or other sciences) that you are most interested in taking this semester (in order of decreasing priority):

Course Number	Course Title	Schedule Block

Appendix A (cont'd)

Incoming Masters Student Advising Data

In order to help address your interests, the Graduate Studies Committee would like to have the following further information in advance of its first meeting with you.

♦♦

Name: ________________________________

Please tell us about your post-Brandeis plans and how you hope the Brandeis MA degree can best advance those plans.

Graduate courses (in chemistry or other sciences) that you are most interested in taking this semester (in order of decreasing priority):

Course Number	**Course Title**	**Schedule Block**

Appendix B

Choosing a Research Supervisor

Choosing a research supervisor is an important part of your first semester of graduate school. Once you have chosen an advisor, you can begin to do some reading and thinking that will allow you to become involved in research activities during this winter's intersession and have a successful first summer of research.

We ask that you visit at least three professors early in the semester to hear about their research. Some students may have focused on a particular advisor even before arriving here, while others will want to explore options after arriving. In any case, we consider it essential that you to talk to a minimum of three potential advisors before you choose one. You should also talk with graduate students and attend group meetings of the research groups you are considering. This will be the best time for you to obtain a broad exposure to the research activities in the Department.

For a first acquaintance with the research interests of specific faculty members, you can reach their research summaries and group web sites via
https://www.brandeis.edu/chemistry/.

As soon as you have identified the professors whose research interests best match yours, you should set up appointments with them to discuss their program. Most faculty members expect to be approached by students interested in hearing about their research. While some professors may seek you out, many will wait patiently for your visit. This does not mean that they are not interested in having you as a group member!

As you visit faculty members please take the attached form with you for them to sign. The top part of this form must be completed before your next meeting with the Graduate Studies Committee (in the latter half of October). Please bring it with you at that time.

Appendix B (cont'd)

Advisor Exploration Form

Student Name: _____

Please obtain dated signatures from faculty with whom you have discussed research interests and projects. At least three are required by the time you meet with the Graduate Studies Committee in the latter half of October.

Professor	Signature	Date
Gieseking, R. L.		
Han, G. G. D.		
Hedstrom, L.		
Krauss, I.		
Pochapsky, T. C.		
Schmidt-Rohr, K.		
Shulenberger, K.		
Ting, C.		
Xu, B.		
Xu, H.		

Appendix C

Mid-First Semester Doctoral Student Advising Data

In order to help address your interests, the Graduate Studies Committee would like to have the following further information in advance of its mid-fall meeting with you.

♦♦

Name: ________________________________

Professors with whom you have already discussed thesis research possibilities (at least three; please bring the form that the professors have signed to our meeting):

______________________________ ______________________________

______________________________ ______________________________

Professors with whom you still plan to discuss thesis research possibilities:

______________________________ ______________________________

______________________________ ______________________________

Graduate courses (in chemistry or other sciences) that you are most interested in taking next semester (in order of decreasing priority):

Course Number	**Course Title**	**Schedule Block**

Appendix C (cont'd)

Mid-First Semester Masters Student Advising Data

In order to help address your interests, the Graduate Studies Committee would like to have the following further information in advance of its mid-fall meeting with you.

♦♦

Name: ________________________________

Please provide an update of your post-Brandeis plans and your thoughts about how the Brandeis MA degree can best advance those plans.

Graduate courses (in chemistry or other sciences) that you are most interested in taking this semester (in order of decreasing priority):

Course Number	Course Title	Schedule Block

Appendix D

Advisor Choice Form

Student Name: _____

Below write the name of your chosen research advisor and obtain his/her signature to signify agreement:

Name _____

Signature _____

Date _____

Appendix E

Memorandum November 1, 2023

To: Chemistry Graduate Students

From: Graduate Studies Committee

Subject: Transfer of Course Credit

The graduate school and chemistry department policy for transfer of credit for course work done elsewhere has been defined to make it as specific as possible. The following points outline the procedures to be followed within the Department and the Graduate School, indicate our specific rules, and indicate the typical amounts of transfer credit that will be given.

a. After completion of one semester, graduate students may apply to transfer credit. However, the process should be initiated by the time of the first mid-semester meeting with the GSC.

b. A cumulative grade point average of 3.5 must have been achieved in the non-laboratory courses taken. A minimum of three courses must have been taken.

c. Transferred courses cannot be used to fulfill a distribution requirement in a field in which the placement exam was failed.

d. Although the maximum number of courses which may be transferred is five, a more typical allowance is only two courses.

e. Credits can be transferred only for courses taken toward a Master's degree or the equivalent.

f. Credit can be transferred only for courses that are essentially equivalent to graduate courses at Brandeis that the student has not taken yet, because the registrar's system is built around Brandeis course numbers only. The student should select courses from their Master's degree transcript and specify corresponding graduate courses at Brandeis that may be essentially equivalent.

g. The graduate school form for application for transfer credit must be filed with the Graduate Studies Committee, giving evidence of courses taken, with supporting information on textbooks, examinations and syllabi, etc. A grade of B or better must have been obtained in the course to be transferred.

h. The number of transferred courses will be determined by the Graduate Studies Committee (in consultation with the student's research advisor) and will be based on

the student's past record, at Brandeis and elsewhere, and the proposed program of study.

Appendix F

BRANDEIS UNIVERSITY
DEPARTMENT OF CHEMISTRY

Plan for Course Work Beyond the 2nd Graduate Semester

NAME: **DATE:**

RESEARCH ADVISOR:

3rd Semester 4th Semester

5th Semester 6th Semester

SIGNATURES:

GRADUATE STUDIES COMMITTEE: _____

STUDENT: _____

RESEARCH ADVISOR: _____

Appendix G

(Bio)Physical/Materials Chemistry Qualifying Exam Guidelines

1. Committee assignment

The rotating division chair will assign a qualifying-exam committee composed of a committee chairperson and two other faculty in the field of the student (who are not the student's research advisor) by July 1 before the beginning of the third semester.

2. Selecting one of two exam tracks

Students can choose between two different qualifying exam tracks:

(i) A two-part literature-based track, described in detail in the following;

(ii) A one-part research-focused track following the rules and deadlines established by Dr. Krauss for organic-chemistry and chemical-biology students.

Students should start a conversation about these two options with their research advisor in June and submit their selection decision to the Graduate Administration Office by June 30.

3. Two-part literature-based exam track

3.1. Goals

This qualifying exam practices and tests students' written and oral scientific communication skills, which are indispensable during PhD research and for later careers in academia, industry, or government. It also tests students' ability to understand, explain, and discuss cutting-edge scientific results and to work critically with published literature and research results. If generative AI was used, this must be acknowledged in detail in the written documents. The specific scientific topics for these exams are chosen by students themselves.

3.2. Overview of the two parts

The qualifying exam consists of two parts, *each* requiring both submission of a *written* document to the committee and an *oral* exam in which the document is explained and defended in front of the committee:

Part I – Critical Literature Analysis

Part II – Research Proposal

Students should start preparations for Part I by **July 1** in their second year (Dec. 15 for mid-year students). The subsequent timing steps are specified in the following detailed explanations.

3. Part I – Critical Literature Analysis

It is a major goal of this part of the exam to teach students to approach scientific literature and, by extension, research results with the appropriate amount of skepticism. As the eminent chemist Richard Zare put it: "Being a scientist puts you into a constant schizophrenic existence…You have to believe and yet question beliefs at the same time."

The student is asked to identify a relatively recent (less than twenty years old) peer-reviewed research publication (labeled paper 2 in the following) in chemistry or related fields that claims to overturn previous conclusions in its field. It is usually advisable that the student also selects an earlier publication (labeled paper 1 in the following) that states the previous conclusions. A suitable paper 2 can often be found by reading the highlights/news/perspectives/comments sections of journals such as *Science*, *Nature*, or *Chemical & Engineering News.* The student can and should ask their thesis advisor for guidance and advice in the search for a suitable paper 2. A suitable paper 1 is often cited in paper 2. The search for a suitable paper 2 should take no longer than two weeks and conclude before July 15. For Part I of the qualifying exam, students cannot choose papers used previously by a student in the program.

Once the student has made a tentative selection of paper 2 and possibly 1, they should send an email to the committee chairperson with a brief summary of how paper 2 overturns (the word must be used) previous conclusions. Paper 2 and, if applicable, 1 should be provided as a link or attachment. The chair person should respond within 48 hours giving approval or explaining why paper 2 does not fulfill the requirements.

After gaining the chair's approval, the student should prepare a written analysis with inclusive citations that

(1) provides a brief background and motivation for research in the area of the papers discussed;

(2) describes the earlier conclusions (e.g., in paper 1) and what evidence they were based on;

(3) describes the newer conclusions in paper 2 and what evidence they were based on, with clarity as to the points of divergence from the previous work;

(4) discusses whether the newer paper 2 has made a convincing case (or not) that previous conclusions were incorrect; and

(5) discusses whether the two views can be reconciled or what further work might be needed to resolve remaining issues.

- One week should be budgeted for the initial literature research and

- two to three weeks for writing up the analysis (this corresponds to about half a page per day).

Points (1) – (3) should be presented in an unbiased manner, without "choosing a side" yet between the different views. All points (1) – (5) should be included as appropriately titled sections in the analysis. Figures need to be numbered and captioned. Each figure should be attributed to its source by "Reproduced from reference xyz." at the end of the caption. The written analysis (including figures) will typically be 6 to 12 pages in length, plus references cited, using a font like 11-pt Arial or 12-pt Times with 1- to 1.5-pt line spacings and ~ 1-inch margins. The student should carefully proofread their own text and then ask colleagues to critique it.

Resources:

- The SciComm Lab (https://www.brandeis.edu/science-communications-lab/) is a resource for development of presentation skills.
- The University Writing Center: https://www.brandeis.edu/writing-program/center/

Timeline of Part I

The student needs to **submit the analysis** to the examining committee and the academic administrator for graduate students **before the start of the third semester** or obtain permission for an extended deadline from the committee chair.

The oral defense of the analysis should be scheduled as early in the semester as possible, but no later than Oct. 15.

Oral Defense of Part I

The student should prepare for presenting and discussing a synopsis of the written report at the board. The student needs to be prepared to answer committee questions in detail by drawing and/or writing on the white- or blackboard. The student will be responsible for bringing the needed markers or chalk, which are available free of charge in the Chemistry Office.

The committee may pose questions throughout the presentation, and particularly at the end. Students will be evaluated on *both their written and verbal* demonstration that they understand the topic (including related fundamental principles) and on their ability to interpret and discuss the relevant research results. At the end of the exam, the committee may ask the students to amend the written report. After the report has been approved by the committee, the student needs to submit the final version to the Academic Administrator for the Graduate Program in Chemistry.

After a conditional pass of the oral but not the written part of the exam, a student has two attempts to correct the written analysis. If the committee finds the second correction attempt unacceptable, the conditional pass is revoked and the student has failed the exam. If this is the first failed try, the student can take the exam again, as outlined elsewhere. If this is already the second failed try, the student has terminally failed and cannot continue in the program.

3. Part II – Research Proposal

Cutting-edge research in academia and industry takes place in the narrow border area between established, i.e. 'old', scientific knowledge or technology on the one hand and desirable but currently unachievable new, grand scientific or societal goals on the other. The ability to select important novel, yet tractable research problems is crucial in many PhD-level jobs in both academia and industry. In order to secure the funding necessary to perform the chosen research project, a researcher needs to convincingly explain to others why the proposed research is (i) important enough to justify the investment of scarce tax-payer or company dollars and (ii) likely feasible using currently available technology. Students will practice these skills in this part of the exam.

Using the format of the dominant granting agency in the student's area of interest (e.g., NSF or NIH), the student is to write a research proposal that

- identifies a scientific problem related to (bio)physical or materials chemistry,

- argues for its significance,

- proposes a study to address the problem, and

- makes the case for its feasibility and usefulness.

Either the system or the methods can be from the student's anticipated research area, but not both.

The scope of this proposal can be more limited than would be appropriate for a real proposal to a federal grant agency. It is sufficient if the proposed work would result in one substantial peer-reviewed publication.

Formatting guidance

The proposal (including figures) will typically be 9 to 14 pages in length, plus references cited, using a font like 11-pt Arial or 12-pt Times with 1- to 1.5-pt line spacings and ~ 1-inch margins. Figures need to be numbered and captioned. Any copied figure should be attributed to its source by "Reproduced from reference xyz."

Students using the NSF proposal format should familiarize themselves with the Broader Impacts criterion sufficiently to be able to discuss it with the committee, but its inclusion in the written proposal is optional.

The following is guidance based on the NIH proposal format. It is meant only as a guide, not as a list of requirements.

II.A. Specific Aims (up to but not exceeding one page)

Summarize the project and emphasize its significance in an introductory paragraph or two. Then provide one short paragraph to define each concrete research goal (Specific Aim) in the project. Depending on complexity, one or two Specific Aims may be appropriate.

II.B. Proposal Body (2500-3500 words, not counting the reference list)

II.B.1. The **Significance and Background** of the project: what is the research topic, what is its impact, what is the literature precedent?

Background: will summarize relevant papers related to the proposed work.

Significance: will describe how the proposed research (assuming objectives are met), would fill important gaps in knowledge and drive the field forward. This is one of NIH's five criteria for evaluation of research projects, and NIH language defines "Significance" as follows:

Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?

II.B.2. Innovation: in a paragraph or two, what makes this project unique and different from work by others in the literature? This another of the NIH's criteria for evaluation of projects:

Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?

Be careful to justify your proposed project sufficiently well: One can drive a nail into a wall by hitting it with a stapler, but when there's a hammer available, the stapler is not a compelling option.

II.B.3. Approach (Research Plan):

The specific experiments planned from the outset should be provided, with design rationale and literature citations where appropriate. Be clear about what hypotheses you are testing, how you arrived at these hypotheses

(using literature precedent to back up your claims where necessary/possible), and the methodology to be used to test your hypotheses. Predict potential outcomes of experiments when possible, or at least describe what knowledge you will gain from different outcomes. A strong proposal will also anticipate potential problems and provide strategies to troubleshoot and alternative approaches to address pitfalls. In other words, what are you going to do if idea A doesn't work? Is there a plan B? Are there new research directions that might arise along the way?

All prior work must be cited throughout the proposal. The use of Endnote (see https://www.brandeis.edu/its/services/software-business-systems/software/index.html or https://guides.library.brandeis.edu/citations) or equivalent reference management software is highly encouraged. Number in text, e.g., [1], and full citation with title in a Reference list, possibly abbreviating >6 authors with et al. A suggested format is as follows:

Sirohi D., Chen Z., Sun L., Klose T., Pierson T. C., Rossmann M. G., et al. The 3.8 Å resolution cryo-EM structure of Zika virus. *Science* **2016**; *352*: 467.

Timeline of Part II

Selection of the proposal topic should start within one week of passing Part I of the qualifying exam and may take up to three weeks. The student needs to inform the committee chair by email, with cc to the research advisor, about the topic of the proposal and describe briefly how it differs from the student's PhD research. The research advisor has to give written approval of the topic of the proposal in Part II of the qualifying exam and affirm that in their research group and, to their knowledge, in other research groups, the proposed research has neither been done nor seriously considered. The committee chair should quickly approve the topic or express any objections or concerns they have about it.

Preparation of the written proposal should take a total of three to six weeks. The student needs to **submit the written proposal** to the examining committee and the academic administrator for graduate students at least a week before the oral defense and **by December 1** or obtain permission for an extended deadline from the committee chair.

The oral defense of the proposal should be scheduled as soon as possible after the written proposal has been nearly finalized, but no later than Feb. 15.

Oral Defense of Part II

Same as for Part I.

Appendix H

Organic/Chemical Biology Qualifying Exam

I. Procedures:

The rotating division chair will assign a committee of two faculty in the field of the student (who are not the student's research advisor) by the beginning of the third semester. By **September 30th**, the student and advisor will meet to discuss progress toward the qualifying exam. The assessment of progress in this discussion is put in writing, making it clear if the student is considered to be on track to likely pass the exam or not. If not, changes required to make a successful exam more likely need to be described and advice on where the student can find help with making these changes should be given. The document is signed by both advisor and student, and shared with the rotating chair of the division and the DGS by September 30.

By **November 1st**, the student will submit to the adviser a complete draft of the qualifier documents detailing his/her research project plan and progress. The adviser will provide the student with detailed feedback within 2 weeks. The student will then submit the final draft to the committee by **December 1st** and defend it by **January 15th**. The report and defense will be made to the committee, who will recommend either "pass", "conditional pass" or "fail".

"Pass" means that the student demonstrated strong written and oral understanding of the project, made enough research progress to provide some confidence of a timely Ph.D. degree, and that the experimental writeup was reproducible with publication-quality data. Minor content edits may be requested, but the student will be readmitted for Year 3.

"Conditional pass" denotes that the student demonstrated good understanding of their project, but their research progress was not convincing enough to demonstrate likelihood of a successful PhD. These students will be admitted for Year 3 but must submit a new progress report and experimental section by the following November 1st and defend it successfully by the following January 15th to stay in the program beyond Year 3.

"Fail" denotes that either the student's understanding of the project is inadequate, the experimental documentation needs improvement, or lack of research progress indicates little chance of successful completion of the degree. Students who receive a "fail" will have an opportunity to repeat the defense by **February 15th**, with the research advisor as part of the committee, at which time a final decision will be made whether the student can stay in the program beyond the end of that Spring semester. Mid-year admits will go through an identical process during their 3rd and 4th semester on analogous dates.

Policy for Delaying Qualifying Exam: If, in the abovementioned meeting by **September 30th**, it is determined that a delay of the qualifier is necessary, the rotating chair of the division (or other faculty in that division, if the advisor is the rotating chair) may grant an extension until **March 1st** for submission of the qualifier document and **May 15th** for its defense. Extensions will only be granted under exceptional circumstances. If the student and adviser disagree, then the decision will be made by consensus of the other faculty in the same division. For mid-year admits, analogous dates of **Dec 31st**, **June 1st** and **August 15th** apply.

II. Written research plan and progress report

This will consist of two documents:

1. A research proposal/progress report

2. An experimental section

Research proposal/progress report: In a format similar to an NIH proposal, this proposal/progress report document will present the scientific background literature (from the PI's lab and elsewhere as applicable), the significance and innovation of the work, the initial research plan, progress so far, and immediate future plan. This will consist of a short Specific Aims page, followed by a main section of 2500-3500 words, which is about 5-7 single-spaced pages in Arial 11-pt font, depending on the number and size of figures. Generative AI may not be used without the advisor's permission because this would be a breach of confidentiality of the research group's unpublished ideas.

Experimental section: This appendix will be of unlimited length and will contain publication-quality experimental procedures necessary to reproduce the work, along with publication-quality characterization data for small molecules (new compounds' HNMR, CNMR and relevant P- or F NMR, IR, MS, mp for solids, optical rotation for optically active compounds and images of pure NMR spectra) and peptides (LC chromatograms and mass spectra), or relevant gels, images, plots and data for biological experiments, including all necessary positive and negative controls.

II.A. Specific Aims (less than one page)

Summarize the project and emphasize its significance in an introductory paragraph or two. Then provide one short paragraph to define each concrete research goal (Specific Aim) in the project. Depending on complexity, one or two Specific Aims may be appropriate.

II.B. Proposal/Progress Report Body (2500-3500 words, not counting the reference list)

II.B.1. The **Significance and Background** of the project: what is the research topic, what is its impact, what is the literature precedent, based on the adviser's previous work and that of outside investigators?

Background: *The advisor must supply the student with a substantial list of relevant background papers in the summer, at the outset of research.* The student will have read and understood these papers and their relevance to the field and the research plan; the proposal will summarize how the most relevant of these papers (and possibly additional papers the student has found) support the proposed work.

Significance: The student will describe how the proposed research (assuming objectives are met), would fill important gaps in knowledge and drive the field forward. This is one of NIH's five criteria for evaluation of research projects, and NIH language defines "Significance" as follows:

Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?

The committee will judge this part of the report (and similarly the presentation) primarily on the background knowledge demonstrated by the student. Although the student should be able to make a

cogent argument for the Significance of the project, less weight will be placed on this Significance, since that is largely a function of the adviser's assigned project.

II.B.2. Innovation: in a paragraph or two, what makes this project unique and different from work by others in the literature? This another of the NIH's criteria for evaluation of projects (see NIH language below):

Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?

Similar to "Significance" above, the student should be able to make a cogent argument for how aspects of the project are "innovative", but the evaluation of the student will place less emphasis on this section compared with the Background and the Research Progress.

II.B.3. Approach (Research Plan and Progress):

a. **Preliminary research design and proposed methods**. The specific experiments planned from the outset should be provided, with design rationale, literature citations where appropriate, and enough detail to show the reader that the student knows exactly what to do on Day 1, and roughly throughout the first 6 months. Be clear about what hypotheses you are testing, how you arrived at these hypotheses (using literature precedent to back up your claims where necessary/possible), and the methodology you will use to test your hypotheses. Predict potential outcomes of experiments when possible, or at least describe what knowledge you will gain from different outcomes. A strong proposal will also anticipate potential problems and provide strategies to troubleshoot and alternative approaches to address pitfalls. In other words, what are you going to do if idea A doesn't work? Is there a plan B? Are there new research directions that might arise along the way?

b. **Research progress.** The results/progress should be presented in detail. As projects vary widely in difficulty and timeline, it is not expected that a project be completed or published by this stage, but the student must have accomplished work of sufficient quantity and rigor to indicate a reasonable chance of a Ph. D. within 5 years.

c. **Interpretation and future plans.** This section must provide a rigorous analysis of the results of the project so far and present the experimental plan to either continue the project through the end of year 3, or the background, significance and research plan for a new project.

All prior work must be cited throughout the proposal. The use of Endnote or equivalent reference management software is highly encouraged. Number in text, e.g., [1], and full citation in a Reference list, abbreviating >6 authors with et al:

> Sirohi D., Chen Z., Sun L., Klose T., Pierson T. C., Rossmann M. G., et al. The 3.8 Å resolution cryo-EM structure of Zika virus. *Science*. **2016**; *352*: 467.

The committee's pass/fail determination will primarily be based on the student's research progress (~50%) and their understanding of the project background/data interpretation (~50%).

II.C. Experimental appendix. As mentioned above, this appendix will be of unlimited length and will contain publication-quality experimental procedures necessary to reproduce the work, along with publication-quality characterization data for small molecules (new compounds' HNMR, CNMR and relevant P- or FNMR, IR, MS, mp for solids, optical rotation for optically active compounds and images of pure NMR spectra) and peptides (LC chromatograms and mass spectra), or relevant gels, images, plots (including all relevant positive and negative controls) and other data for biological experiments.

III. Research Presentation (Oral)

By January 15th, the student will meet with the committee to present the project plan and research progress. The presentation will be done with PowerPoint and last approximately 50-60 minutes including questions/answers. The student should be prepared to speak for at least 40 minutes if uninterrupted, though questions will most likely be asked throughout the presentation.

III.A Introduction

During the introduction, students are expected to present the background, significance and innovation of their project and the preliminary research plan summarized in their written report. The student's understanding of the project background literature, research hypothesis and objectives will be a critical criterion for pass/fail.

III.B Research Progress

Students should present key experiments they have done in the summer and in the Fall of their second year. Although the results themselves are critical, some emphasis will be placed on how well they are able to communicate them logically, and especially, to interpret the data obtained. Students are not expected to have completed projects at this time. However, they should present any data obtained in the summer and in the fall of their second year in a logical way and explain how these results led them to new experiments they have or will do in the future.

Question/Answer

The committee may pose questions throughout the presentation, and particularly at the end. Students will be evaluated on *both their written and verbal* demonstration that they understand the project (including related fundamental principles) and on their ability to interpret and discuss their research results.

Suggested Resources

The SciComm Lab (https://www.brandeis.edu/science-communications-lab/) is a resource for development of presentation skills.

- The University Writing Center: https://www.brandeis.edu/writing-program/center/
- Citation management software (e.g., Endnote): https://guides.library.brandeis.edu/citations

APPENDIX I

Guidelines for Chemical Biology/Inorganic/Organic Seminars

Some general guidelines for preparing a successful seminar presentation are discussed below:

1) Choice of Topic:

Choosing a good topic of appropriate scope is very important for a successful seminar. The seminar topic should be on a new area or method, not presented in seminars or courses, and be sufficiently narrow in scope to be presented in depth in 45-50 minutes. Students should consult with their research advisor about six weeks before their seminar date in order to confirm the appropriateness and scope of their proposed topic. **The presenting student must provide the Graduate Affairs office with a form containing title and topic information with the signature of the student's research advisor indicating that the topic has been approved no later than four weeks before the seminar.**

The presenter should plan to leave the audience with two t o four ideas, concepts, results and conclusions that the audience will remember as significant and useful. The presenter will be expected to answer questions knowledgeably.

2) Format:

The seminar should be prepared using PowerPoint. A good seminar will have a solid introduction detailing the importance/significance of the area, followed by a number of specific examples that amplify the points made in the introduction. The conclusion should summarize and support what has been illustrated, but also speculate intelligently on the future promise and likely continued interest/success of the area. Students are encouraged to consult with their advisor, the seminar chair, and/or other faculty to help in strengthening their talk.

3) PowerPoint graphics (figures, schemes, etc…) and tables:

Graphics and tables are important elements of any presentation and are used with the intention of clarifying a subject. However, if not carefully and thoughtfully prepared, they can be confusing and make a presentation less understandable. In general, do not crowd too much information into one graphic (or slide) and avoid graphics which do not clearly express a point that you want to make to the audience. You should consult with your faculty advisor about the appropriateness and layout of graphics and tables.

Graphics or diagrams that are borrowed from Web-based or published materials must be properly referenced. **Moreover, if such figures are part of your presentation, you are responsible for understanding every aspect of these figures and you must be prepared to answer detailed questions about them**. Inadequate understanding of the figures you present may be grounds for failure of the seminar course, which would jeopardize your standing in your degree program. An electronic copy of the PowerPoint presentation (and/or any other A/V materials used) must be provided to the Graduate Affairs office (Anne Lazerson) after the seminar. Note that the quality of the PowerPoint slides (or other A/V materials) will be a factor in the grading.

4) Grading:

Seminars will be evaluated by the attending faculty. Students presenting a seminar will be awarded a letter grade, whereas students not presenting will be awarded a pass/fail grade. Seminars earning less than a B- grade may have to be repeated, and may jeopardize standing in your degree program.

Updated 2/5/19

APPENDIX J

ORGANIC CHEMISTRY AND CHEMICAL BIOLOGY SEMINAR

TOPIC APPROVAL FORM

(Please return to the graduate affairs office complete with signatures.)

Topic must be approved at least 4 weeks in advance of the seminar.

Student Name: _____

Research Advisor: _____

Program (O/I): _____

Proposed Topic/Title:

_____

_____

_____

Are there at least five significant experimental papers published since the last major review of this topic? If no, please explain.

_____

_____

_____

_____
Approved (Research Advisor Signature and Date):

_____
Noted (Seminar Chair Signature and Date):

You should prepare an outline and show it to your advisor well in advance of the seminar date. Be certain to include in your outline two or three ideas that you would like the audience to remember after your presentation. You should also check with your advisor about the appropriateness of any audio-visual aids (slides, computer graphics, models) that you plan to use.

APPENDIX K

Klaus Schmidt-Rohr Spring 2023

Guidelines & Deadlines for Presenters of Physical/Biophysical/Materials Chemistry Seminars

1. Choice of Topic

2nd year graduate students should choose a subject unrelated to their thesis work, while 3rd year students may cover any topic.

Choosing a good topic of appropriate scope is very important for a successful seminar. The seminar topic should be on a new area or method, and be sufficiently narrow in scope to be presented in depth in 45-50 minutes. The presenter should plan to leave the audience with two to four ideas, concepts, results and conclusions that the audience will remember as significant and useful. The presenter will be expected to answer most questions intelligently.

2. Format

A good seminar will have a solid introduction detailing the importance/significance of the area, followed by a number of specific examples which amplify the promises made in the introduction. Finally, the conclusion should summarize and support what has been illustrated, but also speculate intelligently on the future promise and likely continued interest/success of the area. Students are encouraged to consult with the seminar chair, their advisor and/or other faculty, for help in strengthening their talk.

3. Visual Aids

Tables, schematics, reaction schemes, etc., should be presented so as to clarify a subject, not confuse it. Check with your faculty advisor regarding the appropriateness of your A/V materials.

Materials that are prepared from Web-based or published materials must be properly referenced. Note that the quality of A/V materials used will be a factor in the grading.

4. Practicing your Talk

The presenter should practice their talk in front of an audience at least once before the seminar. Try to include people who know nothing about the subject in the practice audience.

5. Grading

Students presenting a seminar will be awarded a letter grade, whereas students not presenting will be given a pass/fail grade for attendance. The presentation will be evaluated and graded by the faculty member who is the instructor of record of CHEM 240. The quality of the PowerPoint slides (or other A/V materials) will be a factor in the grading. Seminars earning less than a B- grade will have to be repeated.

6. Deadlines

At least 3 weeks prior to the seminar date, the presenting student must provide the seminar chair and the research advisor with a draft of the title and a short, 1 paragraph abstract for approval.

At least 2 weeks prior to the seminar date, the presenting student must provide the seminar chair and the research advisor with

a) a final copy of the approved title and abstract, and
b) a tentative outline of the talk (e.g., a list of slide titles).

The final copy of the approved title and abstract should also be provided to Anne Lazerson for the departmental record and for posting notices.

Annual Thesis Progress Meetings:

Thesis Advisory Committee. The Thesis Advisory Committee comprises the thesis supervisor and at least two other faculty members chosen by the student. At least one of the latter must be a member of the Chemistry Department.

Annual thesis progress meetings. Starting in the third year of study, the student must meet with his/her Thesis Advisory Committee at least once every academic year to discuss progress towards completing thesis research and writing the dissertation. These meetings need to be arranged by the student, and the student brings along the form required for committee members to record comments and recommendations.

For the first Thesis Progress Meeting, held in the third year, the student submits a written description of the general aims of the thesis research project and the progress made towards these aims. For subsequent meetings, the student submits an update that includes a rationale for any changes in aims, a description of progress, and a list of any presentations or publications. These reports, whether composed in prose or slides, should be submitted to the committee members and to the Graduate Affairs Office as a pdf file.

The student shares a draft of the report with the supervisor by mid-March to obtain feedback. The finished report must be distributed to the committee members by the end of March. Subsequently, the committee meeting can be scheduled; it has to take place before the end of April.

Optional additional meetings. The student should feel free to call an additional meeting at any time s/he feels that the advice of the Thesis Advisory Committee would be helpful. The thesis supervisor may also call an additional meeting for committee input.

Career Planning. In preparing for meetings with their Thesis Advisory Committee, students are encouraged to make use of IDP (Individual Development Plan) resources at

https://chemidp.acs.org
http://myidp.sciencecareers.org

These resources may help students to identify ideas and questions that they would like to discuss with their committee.

Thesis Defense Committee. Once the Thesis Advisory Committee agrees that the student has satisfied all thesis requirements set by the graduate program and the student's thesis supervisor, the student will be asked to assemble a Thesis Defense Committee. This committee typically includes some or all members of the Thesis Advisory Committee and must also include an "outside reader" (an expert outside the department and often outside of the University). The outside

reader should be chosen in consultation with the student's thesis supervisor several months in advance of the defense.

Appendix M

BRANDEIS UNIVERSITY

Chemistry PhD Program

Annual Progress Meeting Form

The undersigned (see reverse) held a meeting with

_____ on _____
Student's name date

to discuss the progress made, and to be made, toward the completion of the PhD degree.

☐ The student was reminded that this is an opportunity to discuss their **I**ndividual **D**evelopment **P**lan.

To be filled by the student before the meeting:
Years in program:

Journal articles submitted to date:

Student's teaching load in the past year:
and anticipated for the next year (if known):

Anticipated date of graduation:

To be filled by the committee after the meeting:
Comments on the written progress report and/or the oral presentation:

(see reverse)

Preliminary goals for the next year (projects, manuscripts, conferences, ...) or for completion of the PhD:

Space for additional comments:

committee member signature	committee member printed name
committee member signature	committee member printed name
dissertation supervisor signature	dissertation supervisor printed name

Instructions for the student:

Make a photocopy of the completed form for your own files

Bring the completed original to the Division of Science, Graduate Affairs Office.

Appendix N

List of Courses by Placement-Exam Area

If a student fails to pass a placement examination, a graduate course in that area of chemistry must be passed before the end of the second year. Courses appropriate for this purpose are listed by area in the following.

Physical Chemistry

Any CHEM 14X course
CHEM 160

Organic Chemistry

Any CHEM 13X course
Any CBIO 10X course

Inorganic Chemistry

Any CHEM 12X course
CHEM 161

Resources for Graduate Students and ways to get help

At many points during your graduate career you will probably have questions you'd like to ask someone, great ideas you'd like to share, or concerns you'd like someone to address. Please know that there are many people here on campus to answer those questions, help, and support you. Before we go into specifics of who to ask for help, please know that the majority of people on campus are "responsible reporters." This means that they are obligated to share any information that has been disclosed to them regarding discrimination, harassment, or sexual misconduct with the Office of Equal Opportunity. If you are hoping to have a confidential conversation about one of these topics, you will find a list of confidential resources later in this section.

Most issues can be best addressed by those closely associated with your graduate program or with Division of Science staff and faculty so we encourage you to seek assistance from this group first. We recognize that sometimes there may be a particular person that you are more comfortable speaking with or that one faculty member may be holding multiple roles/positions, but we suggest that you reach out to for assistance in the following general order (see schematic at the bottom as well):

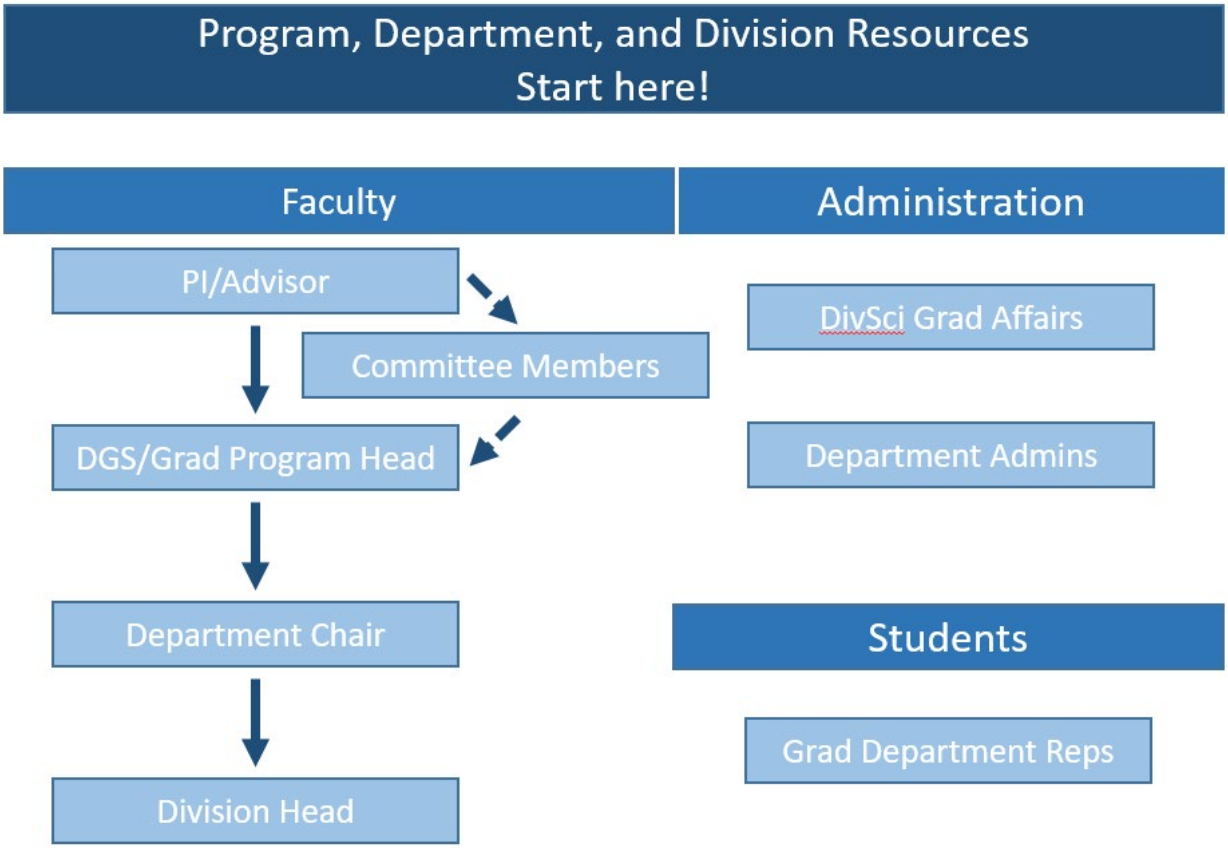
- **Your PI/Advisor:** Your first stop should be your PI/advisor, if you have chosen one by this point. Your PI will have the most intimate knowledge of your research and career goals, and is here to help train and guide you. PIs usually have regular meetings with their students and you are encouraged to use this time to talk about anything that's on your mind—not just your latest research results.
- **A member of your committee (once you have one):** You are always welcome to reach out to any faculty member on your committee. While not tied to your progress as closely as your PI/advisor, they will be familiar with your progress in your program and will have sufficient background knowledge on your project and your goals to provide personalized support. Committee members will be especially good resources if you have concerns about some aspect of your project design or results. Keep in mind also that while annual meetings with your committee are required, you can call additional meetings at any time.
- **DGS (Director of Graduate Study, or chair of your grad program):** This faculty member oversees your grad program as a whole, and is here to support all students in the program. They will be extremely knowledgeable in the program's requirements and are also tuned in to the current GSAS and University policies. The specific faculty member who fills this role may change from year-to-year, so check with your program administrator or check your program website for the current DGS first. In academic year 2024-2025, your DGS is Klaus Schmidt-Rohr.
- **Your program's Department Chair:** This faculty member oversees the department that your grad program falls under and is a step above your DGS. If you have concerns that aren't necessarily specific to your grad program but are relevant to the department as a whole, the chair may have good insight. Chairs are good to talk to if concerns are shared with other populations in the department such as staff, postdocs, or undergraduates. The specific faculty member who fills this role may change from year-to-year, so check with your program administrator or check your program website for the current Chair. In academic year 2024-2025, your department chair is Thomas Pochapsky.
- **The Head of the Division of Science:** This faculty member oversees the entire Division of Science, and works to support all of the departments and graduate programs within the sciences. The head of the Division of Science has frequent meetings with individual program and department chairs, as well as with leaders across the University, so they will be knowledgeable about current Division and University practices. They are here to support and advocate for the entire science community. Talk to them if people from different graduate programs or departments have a shared concern or to raise. In particular, concerns about research integrity should be brought to the attention of the Head of the

Division of Science. As with the DGS, the faculty member in this role can change from time-to-time. In academic year 2024-2025, the chair of the Division of Science is Susan Birren.

In parallel to these program-level and Division-level faculty resources, there are non-faculty resources within the Division who you can go to for help. The following are good places to go to for help:

- **The Division of Science Grad Affairs Office:** This office is the administrative home for most of the graduate programs within the Division of Science. The staff here work closely with grad students and faculty to administratively oversee those graduate programs and to monitor student progress. The staff in this office know your program's faculty, are well-versed in your program's requirements and policies, and are up-to-date with the other sources of support on-campus. If you are unsure about who to talk to first the DivSci Grad Affairs Office is often a good place to start as they can help you decide who to approach and how to have that conversation. Within this office, Anne Lazerson is the primary contact for your graduate program. You should also feel free to contact Maryanna Aldrich, who oversees this group.
- **Your Department Administration:** These staff work in your department's office and are here to help their entire department community. These staff may be a bit less familiar with your graduate program requirements, but they know your department's faculty and any non-grad-program details about your department well.
- **The DivSci Pre-Award Office:** If you are applying for grants or fellowships, please loop these staff in. They may be able to provide guidance and help you navigate the submission process.
- **Your program's Grad Department Representatives (GDRs):** These graduate students were elected to represent the student body in your graduate program. One of the roles of the GDR is to bring concerns from students as a whole to the program faculty or to GSAS, so if you have a concern that you are comfortable discussing with your GDR it's a good idea to let them know. They cannot bring these concerns to the faculty to advocate for all students if they don't know about them, and there may be other students with similar concerns. Your GDRs may hold a student "town hall" once a semester or year to bring up issues, and this is a good forum to discuss some topics that may be weighing on your mind.

Below is a flow chart demonstrating the general hierarchy of sources of support:



Outside of the general hierarchy of Division of Science places to go to for help, that are various other entities on campus here to support students. These resources on campus are dedicated to supporting graduate students:

- The Graduate School of Arts and Sciences (GSAS): GSAS oversees all graduate programs within the school of Arts & Sciences at Brandeis and is invested in the success of all graduate students in these programs. If you have a topic that you'd rather discuss with someone outside of the Division or want a non-DivSci perspective on, the staff in this office are a great resource for graduate students. GSAS is also a good resource if you are uncomfortable discussing a topic with any of the resources mentioned so far or if you have not made sufficient progress in those discussions. Depending on the topic that you have raised with faculty or administrative staff, they may have already contacted GSAS for advice/assistance on how to help or to handle the next steps. GSAS and your program/department faculty or the Head of the Division of Science frequently work together to support students, resolve problems, and enact positive changes. Please visit their staff directory to explore the areas GSAS can help with. If you are in a research group with limited funding, GSAS provides conference and research awards for PhD students and Master's students. They also strongly encourage students to apply for external fellowships and grants.
- The Office of Graduate Affairs**:** This office is a home and source of support for all graduate students at Brandeis, including those studying at the Heller School, the Rabb School, or the International Business School. Graduate Student Affairs provides students with information and events about graduate life at Brandeis and community resources.
- The Graduate Student Association (GSA)**:** Supported by The Office of Graduate Affairs, the GSA is an independent student body that represents all graduate students and provides a platform for graduate students to raise issues and concerns and build community. If you have a concern about an issue affecting graduate students that extends past your program, department, and the Division of

Science, the GSA is a good group to talk to. To connect with them, visit their website to see the current year's grad student exective committee.

There are some offices on campus that specialize in specific topics and who will almost always be the best resource for those topics:

- The Office of Research Administration (ORA): ORA, which reports to the Vice Provost for Research, can help with issues related to research integrity and compliance. If you want to discuss the possibility of research misconduct, you may wish to report things there directly.
- The International Students and Scholars Office (ISSO)**:** ISSO supports all of Brandeis' international students and scholars. This office determines visa eligibility and prepares and issues visa documents. If you ever have any questions about your Visa or any of the associated reglations (e.g. travel, CPT, OPT), you should reach out to your ISSO advisor. They can advise students on rights and responsibilities and provide guidance regarding issues that may impact your legal status. Their website also has a collection of useful information for international students.
- Student Acessibility Support: If you are a student with a disability and in need of academic or non-academic accommodations, this office can support you and help you navigate this process. The definition of a person with a disability is broad, and may students who do not think of themselves as students with disabilities may qualify for support under the law. Even if are you not sure if you will quality, you are encouraged to reach out to SAS.

As mentioned at the start of this section, there are some topics that responsible reporters on campus cannot keep confidential, and those are issues of discrimination, harassment, or sexual misconduct. The office on campus that addresses these issues is the Office of Equal Opportunity (OEO)**.** OEO provides information regarding support resources, information about taking action (internal resolution processes and criminal action), inquiries and investigations into concerns, processes to address grievances, and training for the Brandeis community. Please visit their website for contact information and steps (and an an online form) to file a report. You are welcome to contact a resource listed above for support or advice about these topics, but they will be obligated to share the issue with OEO.

If you would like to have a *confidential* conversation with someone on campus, the following are our on-campus confidential resources:

- The Brandeis Couseling Center (BCC)
- The Brandeis Health Center
- The Prevention, Advocacy, and Resource Center (PARC)
- The University Ombuds
- The Chaplains in The Center for Spiritual Life

Appendix P

Individual Development Plan
(Annual Self-Review)

This form is for you to complete prior to your annual meeting with your Thesis Advisory Committee. You may also wish to make use of the AAAS career planning tool at http://myidp.sciencecareers.org

A. CAREER OBJECTIVES
(What post-degree options are you considering? Can you be more specific than last year?)

B. PROGRESS IN THE PAST YEAR

1. Research productivity *(on each project, including reports at meetings or in journals)*

2. Communication skills *(i.e., experiences in writing, presenting and mentoring)*

3. Scientific independence *(i.e. what did you learn how to do that you weren't good at before?)*

4. Mentoring received *(from your PI, from others in your group, from outside your group)*

C. PLANS FOR THE UPCOMING YEAR

1. What are your goals for research? *(Address each project specifically.)*

2. What are your goals for communication skills? *(Be specific regarding writing presenting and mentoring.)*

3. In what areas do you still need to grow to be completely independent scientifically? *(i.e. what do you still not know how to do well without a lot of help?)* **What is your plan for closing this gap? (***i.e., specific activities or changes you will make to ensure growth in this area?***)**

4. What do you need to do to meet the above goals?

5. What do you need from your mentor(s) to meet these goals?

D. OTHER THOUGHTS YOU WOULD LIKE TO SHARE