

RICE DEPARTMENT OF
BIOSCIENCES

2018 - 2019

BIOCHEMISTRY & CELL BIOLOGY

**GRADUATE PROGRAM
HANDBOOK**





HANDBOOK OVERVIEW

This handbook summarizes the Biochemistry & Cell Biology Graduate Program policies and procedures and is updated annually.

In addition to being in agreement with the policies in this handbook, Biochemistry & Cell Biology graduate students must also be in agreement with the General Announcements and Code of Conduct. In the case of conflicting information, university-wide regulations take precedence over graduate program regulations, which take precedence over research group regulations. When in doubt, students should seek help first at the graduate program level (graduate program administrator, graduate program director, assistant chair, and/or department chair) and then at the central administration level (Office of Graduate and Postdoctoral studies).

Please contact Rachael Eaton, Susan Cates or Bonnie Bartel with suggestions for additions or clarifications.



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GRADUATE STUDENT HELP MENU

BCB graduate students are welcome to ask any of our staff for assistance at any time. This page provides information regarding each staff member's job title.

The first help resource for graduate students is Rachael Eaton, the staff graduate program administrator. She is the contact for all graduate student records, stipends, scheduling, travel, reimbursements, GSA and graduate student events, as well as candidacy and defense logistics. Her direct back-up for academic matters such as academic records, university offices and procedures, travel, awards and scholarships is Susan Cates. Additional contacts for administrative support when Rachael is unavailable are Lisa Evans at the reception desk, and Shaterica Washington in W100F GRB Hall, and Pedro Muniz in W132 GRB Hall. Diane Hatton assists all graduate students who apply for independent funding and/or other scholarships and fellowships, or whose advisors submit federal grants for their funding. Nidia Aguilar, Connie Myrick, and Lupe Dominguez assist students making lab purchases (please seek instructions from your lab-mates first). Juan Sanchez assists with packages, both delivery and receiving. Gerald Mixon is the contact for facilities issues such as installation of large equipment, building maintenance and refurbishments.

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Facilities Administrator	Gerald Mixon	X4294	gmixon
Receiving	Juan Sanchez	X4233	cjds
Faculty Administrator	Susan Merz	X4198	smerz



BCB GRADUATE STUDENT ASSOCIATION (BCB GSA)

POSITION	NAME	PHONE	EMAIL
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Vice-President	Miguel Ángel Ortiz Salazar	X2445	ma.os
Secretaries	Anna Babushkina Ramya Ganiga Prabhakar	X6788 X2492	asb11 rg42
Treasurer	Jordan Bluford	X4936	jordan.t.bluford
Rice GSA Representative	Melissa Traver	X3034	mst5



Timeline of Biochemistry & Cell Biology PhD Program

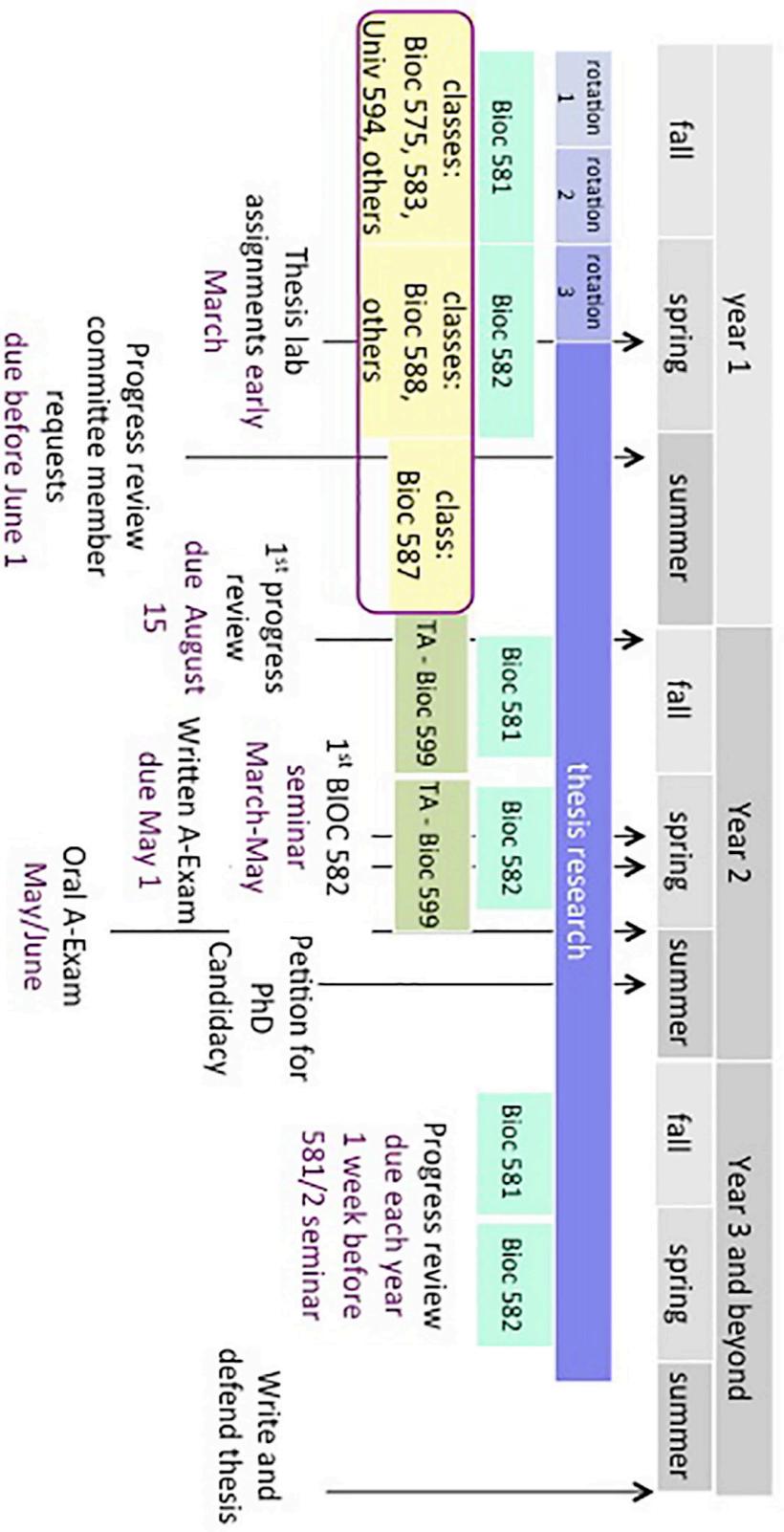




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1. THE CHALLENGES AND GOALS OF GRADUATE STUDY

Graduate education provides advanced specialized training beyond the baccalaureate program. The goals of the graduate training provided by the Biochemistry & Cell Biology Graduate Program are to guide students as they develop into doctoral recipients who:

- Are knowledgeable of past and current research accomplishments and techniques in biochemistry and cell biology
- Are adept in independent problem solving and critical thinking skills
- Have demonstrated capacity for independent, publishable research
- Can thoughtfully relate their research to that of others in their field
- Possess effective written and oral communication skills
- Assume responsibility for continued professional growth
- Strive to continuously acquire the knowledge and skills needed for scholarly achievement and success in their chosen career

Graduate study requires that students be committed to:

- Assuming responsibility and demonstrating initiative in their research and scholarly activities
- Engaging in active learning, including participating in weekly departmental and graduate student seminars, attending relevant seminars outside of the department, and reading extensively within their chosen field of study
- Initiating and completing innovative and productive research activities
- Improving oral and written communication skills
- Accepting and providing constructive scientific criticism
- Exercising high professional standards in all aspects of work

The Biochemistry & Cell Biology graduate program faculty members are committed to training and mentoring graduate students to reach their full potential as scientists. We seek to facilitate students' progression towards fulfilling and exciting careers in academia, industry, or government, and to develop their skills as future leaders in science and society.



2. ADMISSIONS

Admission for graduate study in Biochemistry & Cell Biology requires: (1) a bachelor's degree in biochemistry, biology, chemistry, chemical engineering, physics, or the equivalent; and (2) demonstrated quality and motivation as indicated by the student's previous academic record, Graduate Record Examination scores, and recommendation letters. While we do accept students who have already earned their master's degrees, our program is designed to be a five-year program from the bachelor's degree to the doctorate.

Students must sign and return the "Memorandum of Understanding" which states, in part, that acceptance of the stipend requires that no outside employment or course enrollment is allowed unless approved by the thesis advisor and department chair.

The advanced degree requirements given on the following pages are those established by the Biochemistry & Cell Biology Graduate Program and are above and beyond the general requirements of Rice University for the M.A. and Ph.D. degrees. Students should be familiar with the general University regulations for graduate students that are listed in the Rice University General Announcements. Any changes in these policies and/or regulations will be brought to students' attention by the Office of Graduate Studies and/or the Department of BioSciences.



3. DOCTOR OF PHILOSOPHY DEGREE PROGRAM IN BIOCHEMISTRY & CELL BIOLOGY

Most of the formal courses will be completed in the first year of residence to allow students to commence thesis research at the end of their second semester. During the first year, graduate students will be advised by the Graduate Advising Committee (current members listed in preface, page i). This committee will tailor the formal course program to be taken during the first year.

Students are required to have training in biochemistry and cell biology. If students are missing formal training in these subjects, they are required to take the equivalent background courses during their first year.

The corresponding courses at Rice are:

BIOC 301 Biochemistry (fall, prerequisite, does not count for graduate level credit)

BIOC 341 Cell Biology (fall, prerequisite, does not count for graduate level credit)

All Ph.D. students are required to take the following graduate courses:

BIOC 575 Introduction to Research (fall, 1 hr)

BIOC 581, 582 Graduate Research Seminars (fall & spring, 1 hr per semester of residence)

BIOC 583 Molecular Interactions (fall, 4 hr)

BIOC 587 Research Design, Proposal Writing, and Professional Development (summer, 3 hr)

BIOC 588 Cellular Interactions (spring, 4 hr)

UNIV 594 Responsible Conduct of Research (fall, 1 hr)

BIOC 599 Graduate Teaching in BCB (2 semesters in year 2) (fall & spring, 1 hr each)

BIOC 701,702 Graduate Lab Research (1st year rotations) (fall & spring, 2 hr/course; 4 hr/semester)

Students also must take 6 credit hours from the following advanced courses:

BIOC 523 Extracellular Matrix (3 hr)

BIOC 524 Microbiology and Biotechnology (3 hr)

BIOC 525 Plant Molecular Genetics and Development (3 hr)

BIOC 530/535 Graduate Laboratory Modules in Molecular Biophysics (2 hr each)

BIOC 540 Metabolic Engineering (3 hr)

BIOC 544 Developmental Biology (3 hr)

BIOC 545 Advanced Molecular Biology and Genetics (3 hr)

BIOC 547 Experimental Biology and the Future of Medicine (3 hr)

BIOC 550 Viruses and Infectious Diseases (3 hr)

BIOC 551 Molecular Biophysics (3 hr)

BIOC 552 Structural Biology (3 hr)

BIOC 555 Computational Synthetic Biology (3 hr)

BIOC 558 Advances in Nuclease-Mediated Genome Engineering (3 hr)

BIOC 560 Cancer Biology (3 hr)

BIOC 570 Computation With Biological Data (3 hr)

BIOC 571 Bioinformatics: Sequence Analysis (3 hr)

BIOC 572 Bioinformatics: Network Analysis (3 hr)

BIOC 580 Protein Engineering (3 hr)



Students also may take additional advanced level courses in Biochemistry & Cell Biology (BIOC) and other select graduate courses at Rice, Baylor College of Medicine, University of Houston, or University of Texas Health Science Center. Once the student selects a thesis advisor, the advisor may require additional specialized course work. Safety training will be provided during the first year and must be updated annually according to the policies of Rice's Environmental Health and Safety office.

Course Registration.

Continuing graduate students must register three times per year to remain in the program. Registration is on-line through the Esther system. New students register for fall classes during orientation week after meeting with the advising committee. After the first semester, continuing students register in mid-November for the spring, in early March for the summer, and in early April for the following fall. Exact dates are found at the registrar's web site (<http://registrar.rice.edu/calendars/>). Late registration is permitted but incurs a fee (currently \$75 - \$125) that must be paid by the student. It is the student's responsibility to keep track of the registration dates and to register by the deadline each semester. The graduate advising committee will confer with students about course selections for the first two semesters of residence or until all required coursework is complete.

First-year students register for at least 14 hours in the 1st semester and at least 12 hours in the 2nd semester. Any adds or drops during the first year require the written approval of the chair of the graduate advising committee. First-year students should register for 2 hours each of BIOC 701/702 Graduate Lab Research rotations in both semesters unless otherwise instructed by the advising committee. After the first year, students register for any courses required by the graduate program or the advisor, and then register for enough hours of BIOC 800 Graduate Research to equal 15 hours total for each semester, Fall, Spring, and Summer. (The advising registration worksheet in the Appendix has detailed instructions.)

All second-year students are required to take two semesters of BIOC 599 (Graduate Teaching in Biochemistry & Cell Biology). In this course, students will gain experience in teaching by serving as discussion leaders and graders in sections of undergraduate courses. A required workshop before courses begin will provide TA training and expectations.

All students are required to participate in BIOC 581 and 582 during all years of residency.

Students are also required to attend Biochemistry & Cell Biology seminars beginning with their first semester of residence. The seminar schedule is on the main BioSciences web page, and the seminars are usually held on Mondays.

Students must achieve a minimum overall average of B (≥ 3.0) in the formal biosciences courses to be a candidate for the Ph.D. degree. The BCB graduate program faculty will evaluate the student's overall performance (Chapter 7).



4. TRANSFER CREDIT GUIDELINES

The Biochemistry & Cell Biology Program does not generally accept transfer students from other programs except when the student accompanies a principal investigator who is joining the department faculty. All other students, even students who come into the program with master's degrees, must meet all the requirements of our degree program while enrolled at Rice (Chapter 3). Most courses should be taken at Rice, but with advance approval from the graduate advising committee, graduate students can meet some degree requirements with courses that qualify under the Inter-Institutional Graduate Program agreement between Rice University, the University of Texas System, Baylor College of Medicine, and the University of Houston. The program allows a full-time graduate student to enroll in a course at one of the participating schools when the course is not offered at the student's school. The course is then transferred to the student's home university, as long as the proper procedure is followed. (The registrar dictates the proper procedure and provides forms for the inter-institutional transfer credit, see <http://registrar.rice.edu/gradtransfer.aspx>.)

Students Transferring into the Program with a Faculty Advisor.

Students transferring into the program with a principal investigator who is joining the faculty may receive some transfer credit for courses taken at their previous graduate institution if the graduate advising committee determines that the course(s) taken are equivalent to courses at Rice. In this case, the registrar's Graduate Transfer Request form must be submitted, showing the mapping of the courses from the previous institution's transcript to the appropriate Rice course number and title. Graduate students who have met the Ph.D. candidacy requirements at their previous institution can sometimes transfer into the program with their candidacy intact, if the graduate advising committee determines that the previous institution's requirements for candidacy were comparable to the BCB graduate program's requirements.



5. LAB RESEARCH ROTATIONS (BIOC 701/702)

Lab rotations (BIOC 701/702) are a critical part of the graduate school experience. Rotations assist students in their choice of research advisor, allow students to demonstrate research competence, and provide an opportunity for students to become acquainted with different research areas in the department. Students rotate in two labs in the fall and one lab in the spring; each rotation is worth two credits. Most students will be matched with their thesis labs after three rotations; a fourth rotation is optional if additional lab exposure is desired.

Each rotation lasts approximately 7 weeks. During rotations, the student will spend a minimum of 12 hours a week in the lab performing research and will be mentored by the advisor. The student also will benefit from the help of other graduate students and postdocs in the lab to learn the methods and techniques used in the lab's research. Students should use this opportunity to demonstrate to potential advisors their enthusiasm, responsibility, maturity, and initiative, because rotations are an important component in the process by which first-year students are evaluated and in determining lab assignments for thesis research (described in the next section).

Choosing Lab Rotations.

Each student emails the graduate program administrator a list of three possible choices for the upcoming rotation, ranked in order of preference, by noon on the dates listed below. For the first list, students should meet individually with at least 3 faculty members to learn about possible research projects and obtain a signatures to turn in with the ranked list. The student will receive confirmation of the first rotation assignment within a week after preferences have been submitted, and students will start their rotations as soon as lab assignments are made.

Important Dates:

	Ranked List of 3 Due	Rotation Dates	Rotation Talks
Rotation 1	August 20 at noon	Aug 20 - Oct 8	Oct 4 - 5
Rotation 2	Oct 1, noon	Oct 9 - Dec 12	Dec 6 - 7
Rotation 3	Dec 3, noon	Jan 2 - Feb 25	Feb 21 - 22
Thesis Lab Choices	Feb 18, noon		

Provide a ranked list of 3 faculty names for each rotation, also hand in your list of faculty signatures (separately) to the graduate program administrator. Subsequent rotation lists do not require faculty signatures, but students should talk to all faculty members on their list prior to submission of the list.



During the Rotation.

After a rotation lab has been assigned, it is the student's responsibility to meet with the advisor to discuss and design a research project for the rotation period. The advisor should make clear his/her expectations for the rotation. The student must keep an up-to-date laboratory notebook (Chapter 29) and record the experiments conducted and other useful information for anyone who may follow up on his/her work.

At the End of Each Rotation.

The laboratory notebook is to be turned in to the research advisor on the last day of the rotation. Additionally, a 4-5 page, double-spaced (including figures) summary of the rotation work should be turned in to the graduate program administrator (PDF version) and the research advisor by 5:00 pm on the last day of each rotation. The report should include three sections: background and significance, methods, and results and conclusions. The student may want to include discussions of any difficulties or problems encountered in the research. Furthermore, the student should make a list of relevant materials and reagents (protein samples, DNA, etc.) and specify their location so that they can be used in the future.

Rotation Talks.

After each of the three required rotations, students present 10-minute rotation talks in which they briefly describe their rotation projects, including the background and goals underlying the project, any specific accomplishments achieved during the rotation period, and possible next steps. The students should submit a draft of their presentation to the rotation advisor one week before their talk is scheduled and invite the advisor to attend once the student has been notified of their scheduled time slot (approximately one week in advance). These talks will be scheduled for lunchtime (or evening) meetings and attended by first-year BCB graduate students, the graduate advising committee, and any interested faculty. Individual labs also may have rotating graduate students present their results to other lab members in a group-meeting format. It is advisable to ask the rotation advisor for an opportunity to give the rotation talk in the lab group-meeting format in advance, because this provides an opportunity to practice the presentation, to receive suggestions from lab members, and to make sure the talk stays within the allotted 10-minute time frame. The advising committee encourages the first-year students to be an active audience and ask questions/provide suggestions to their peers.

A grade of S (satisfactory) or U (unsatisfactory) will be given for each rotation (BIOC 701/702) based on motivation and effort in the lab, completion of the written report, and completion of the rotation talk.



6. SELECTING A THESIS ADVISOR

Students and thesis advisors are matched during the second semester in residence. Advisor selection is a very important decision and should be based upon information obtained through BIOC 575 (Introduction to Research), seminar presentations by faculty members, research rotations, and meetings with individual faculty members.

Selection of and acceptance into a lab depends on several factors, including funding, available space, the student's academic standing, rotation performance, and the relationship between the potential faculty mentor and the student. All of these factors are taken into consideration to decide on the final thesis lab and faculty mentor who ultimately will help shape the graduate career. It is important that students actively engage in lab work during the rotation period, including attending lab meetings, interacting with other lab members, and discussing research with the faculty member. These interactions are invaluable to the selection of a lab and thesis advisor by providing insight into the research being conducted in the lab.

After three rotations are completed, each student will submit a list of three faculty members, in order of preference (Chapter 5 for due date). The department chair, in consultation with the Graduate Advisory Committee and faculty, will consider thesis advisor requests and attempt to accommodate student selections within the constraints of available funding, research space, and the judgment of the concerned faculty.

Because thesis lab assignments are made by the department chair, individual faculty members cannot make commitments to individual students prior to the lab assignment date in February. In addition, students should not make commitments to faculty members beyond providing the ordered preference list to the department chair.

The thesis advisor preference list should be carefully composed based on criteria such as the lab's research field, potential future research interests, how well the student and advisor interact on personal and professional levels, and interactions between the student and other lab members. In most cases, the student will be granted his or her primary choice for a thesis research advisor. When a match with the top choice is not possible, the student will likely be matched with one of his or her alternative choices. In the rare case when no match satisfactory to both the student and a faculty member is made, the chair will recommend that the student transfer to another department at Rice or to another institution that is more in line with the student's interests. The student must be assigned to a thesis lab by the end of the second semester in residence to continue in the program. BCB students who are matched with an advisor with a primary appointment in a different program or department will still need to complete the BCB program requirements. In addition, the advisor may have expectations beyond those required by the BCB program (e.g., additional coursework and publications).



7. EVALUATION OF PROGRESS IN GRADUATE STUDY

Six procedures are used to evaluate a graduate student's progress in the Biochemistry & Cell Biology Graduate Program.

1. At the end of each of the first two semesters of residence, the graduate program faculty review each student's course work, performance in laboratory rotations, and motivation. ***Students must maintain at least a B average (3.0/4.0), obtain satisfactory marks in research rotations, and demonstrate potential for research to continue in the Ph.D. program.***
2. ***Continual review of research progress*** is made by the thesis advisor, and a written evaluation is provided by the advisor prior to each progress review meeting after the A-Exam.
3. ***Written and oral progress reports*** are evaluated by the student's progress review committee every year until completion of his or her degree. See Chapter 9 for details.
4. ***A research seminar is presented annually*** in BIOC 581/582 beginning in the second year and continuing until the thesis is submitted and the defense is scheduled. Attendance and participation at the presentations is mandatory for all students. See Chapter 14 for details. Attendance at the BCB guest seminar series is a critical part of the student's professional development and is also expected.
5. By May 1 of the fourth semester in residency, each student must have submitted the ***"Admission to Candidacy Examination (A-exam)"***. This examination consists of a written Ph.D. thesis proposal similar in format to an NIH predoctoral grant proposal. The research plan is developed in collaboration with the thesis director, but the proposal is written by the student. The student's progress review committee will evaluate the proposal. The student defends the proposal in an oral examination in front of this committee and the thesis advisor. The goals are to demonstrate:
 - (a) abilities to organize and present scientific information;
 - (b) a thorough background knowledge of the relevant background literature; and
 - (c) familiarity with the techniques required to carry out the project.Successful completion of these goals will help to facilitate rapid progress toward completion of thesis research. See Chapter 10 for details.
6. ***The Ph.D. thesis defense*** involves a public seminar presentation, followed by oral examination defending the written thesis. All Ph.D. students must defend the thesis before the end of their 16th semester in residency, according to university policy. See Chapter 16 - 17 for details.

Failure to meet the above requirements can result in termination from the program by the department chair, after consultation with the faculty. More details are found in the Rice General Announcements section on dismissal (<http://ga.rice.edu/>).



8. THE RESEARCH PROGRESS COMMITTEE

Each graduate student in the Biochemistry & Cell Biology program is assigned a Research Progress Committee of three faculty, of which at least two will be BioSciences department faculty members, who, along with the faculty advisor, oversee the progress made by the student on his or her thesis work.

Role of the Committee.

The purpose of the committee is to evaluate the student's research progress by administering the Admission to Candidacy Exam (A-exam) after the end of the student's second year and by reading, critiquing, and actively participating in the student's annual progress reviews. This advisory committee, along with the thesis advisor and an outside member, also administers the student's final oral defense and evaluates the thesis manuscript (Chapter 17).

It is important that the student and committee maintain an effective working relationship. Committee members can help resolve disputes (if any) between student and thesis advisor, can supply scientific and technical advice, can assist the student in achieving career goals, and might ultimately provide references for a student when s/he searches for professional positions after the Ph.D. is awarded.

Selection of the Committee.

The committee is made up of two or three faculty members from the BioSciences Department (one of these members will be designated as the chair). The third member can be a faculty member from a neighboring institution, including adjunct BioSciences faculty members. The selection of a committee involves the student, the advisor, and the department chair. The student and advisor should meet and discuss possible committee members, and a list of six prospective committee members should be submitted to the graduate program administrator no later than June 1st of the first year of residence. Candidate faculty members whose **primary** appointment is in BioSciences can be requested without contacting the faculty member. Jointly-appointed BioSciences faculty, adjuncts, and faculty members from other institutions should be contacted by the student or advisor to see if they are willing to serve if selected. The department chair assigns the final committee, making every effort to include at least one committee member from the student's preference list. The final Research Progress Committee is generally assigned by mid-July of the student's first year.

After achieving doctoral candidacy, the student will be required to name an "outside" committee member on the Petition for Doctoral Candidacy (Chapter 11). The outside member must be a Rice faculty member from another department. If the research progress committee already has a Rice faculty member from outside of BioSciences, this person could fulfill the requirement of "outside" member when the student petitions for candidacy.



9. ANNUAL REVIEW OF RESEARCH PROGRESS

In addition to the continual review of progress by the thesis advisor, the research progress committee conducts an annual research progress review of each student. The first meeting (in the 3rd semester of residence) will include the thesis advisor; advisor presence is optional for meetings after the candidacy exam. There are two components of the progress review: the written report and the committee meeting.

Due Dates.

The first written progress report is due at the beginning of the 2nd year (August 15) and is submitted to the research advisor by August 1 to enable time for feedback. After receiving feedback, the student should incorporate appropriate changes and corrections. The Admission to Candidacy exam (A-exam; Chapter 10) replaces the progress review at the end of the 2nd year. Subsequent progress reviews occur annually in conjunction with the BIOC 581/582 seminar until the student has completed a doctoral thesis. The written report must be submitted to the thesis advisor for feedback 3 weeks prior to the BIOC 581/582 research seminar. The final version of the progress report, along with the progress review supplemental documents, described later, will be submitted by 5 pm 1 week prior to the student's BIOC 581/582 presentation (or by August 15 for 2nd-year students). The student emails a PDF of the final report to all committee members, the advisor, and the graduate program administrator. In addition, the student submits hard copies of the final report (can be placed in mailboxes) to the advisor, all BioSciences department committee members, and any non-BioSciences committee members who request hard copies. The student is responsible for (i) copy quality; make sure all copies are in color if it is required for the proper interpretation of figures, and (ii) submission by the due dates (including supplemental documents). Failure to meet these deadlines may result in probation. If the report is not submitted within 3 weeks of the deadline, the department chair, after consultation with the faculty, can dismiss the student from the program.

Document Due Dates:

	Due to Advisor for Feedback	Due to Committee
1st Progress Review	Last week of July before 3rd semester	Aug 15 before 3rd semester
A-Exam	First week of April, semester 4	May 1, semester 4
Subsequent Progress Reviews	3 weeks before 581/582 seminar	1 week before 581/582 seminar
Thesis	consult advisor	2 weeks before thesis defense

The Written Report.

Students should review progress review document guidelines, including plagiarism definitions, prior to preparing documents. The progress review report should be no more than eight single-spaced pages, excluding figures, figure legends, tables, and references. Use Arial 11 or Times 12 font sizes. Excessive length is generally detrimental rather than helpful.



The document given to the thesis advisors 3 weeks before the 581/582 seminar should not be a "rough" draft. It should be a complete, high quality document ready to provide to the committee. The review by the thesis advisor is meant as a final check to ensure that the student has written a clear and cogent document. If students want feedback on rough drafts, the drafts should be provided to the advisor much earlier to enable substantial writing improvements far in advance of the document due date. The Rice University Center for Written, Oral and Visual Communication is available for writing and presentation feedback; schedule a consultation online (<http://cwovc.rice.edu/>). In addition, Dr. Mary Purugganan can provide some writing guidance. Please contact her well in advance if you would like assistance.

The report should contain the following sections:

TITLE--A succinct and informative title that describes the proposed research.

SPECIFIC AIMS--Provide context that allows a reader to understand the rationale for the aims in one or two brief introductory paragraphs. Then, for each aim, list the hypothesis to be tested or rationale for the experiments, the key experiments planned, and the expected results (1 page). The aims should be updated each year to reflect current plans.

BACKGROUND--Should contain all relevant information required to evaluate the current status of the proposed research. All mentions of published work must be referenced. Parts of this section may remain unchanged from previous reports. However, this section must remain current and include recent relevant advances. Advanced students may shorten this section to allow more room to discuss current results (2-3 p).

RESEARCH PLAN--Should contain experimental results pertaining to the specific aims. This section should constitute the bulk of the report. Divide each aim into sections with the following headings ("hypothesis" can replace "rationale" as appropriate).

Aim 1: rationale, previous results, results since last review, future plans

Aim 2: rationale, previous results, results since last review, future plans

Aim 3: rationale, previous results, results since last review, future plans

Relevant data discussed at previous progress review meetings should be only briefly discussed, whereas data obtained since the last progress review should be discussed in more detail. The future plans should include a concise description of the remaining experiments to be conducted (4-5 p).

REFERENCES--Should include full author lists and titles, in a format such as the one used by the journal *Cell*.

Figures and tables.

The use of informative figures and tables describing results or models is encouraged. Figures must be accompanied by legends that enable understanding of the figure without reference to the text. Figures should be of publication quality and incorporated into the text at a point after their first mention. Figures from other sources should include a reference to the source in the legend.



Progress Review Supplemental Documents.

A. The Self-Evaluation (for students entering years 2-4).

The student will fill out a self-evaluation questionnaire and attach to each copy of the Progress Review report. A copy of the questionnaire and a set of progress review guidelines are included in the Appendix of this handbook. Supplements are not required for the A-Exam.

B. Updated C.v. (for students in year 3 and beyond).

The student provides an updated copy of his or her C.v. along with the progress review document beginning in year 3. This is an opportunity to receive feedback from the advisor and committee members on the format and content of the C.v., as well as an opportunity to discuss how various activities might support ultimate career goals. Any C.v. format may be used; an optional template is provided in the Appendix of this handbook.

C. Plans for completion of experiments (for students entering year 5 and beyond).

As students near completion of the Ph.D., the Progress Review Committee attempts to help focus the student's remaining time on completing experiments, publishing results, and writing the thesis. Students entering year 5 and beyond should work with their advisor prior to committee meetings to provide the information requested in supplement C (included in the Appendix of this handbook). Although the Progress Review document takes its usual form, it will be useful to structure the presentation to the committee around questions in the supplement; i.e., show the publication-ready data, show the first attempts at the in-progress experiments, and then outline remaining experiments for each planned publication.

D. The Advisor Letter (for students in year 3 and beyond).

The research advisor must submit a letter containing a written evaluation of the student's progress to the graduate program administrator and to the student prior to each progress review after the candidacy exam, regardless of whether the advisor attends the meeting. This letter is part of the student's permanent file. The meeting will be rescheduled if the advisor's letter has not been submitted. A letter is not required for the first progress review meeting or for the A-exam.

Advisor Presence.

The advisor attends the first progress review and the A-exam as an observer. After the A-exam, advisor presence is optional at progress review meetings. A letter from the advisor to the committee and student outlining student performance must be submitted prior to the meeting even if the advisor attends the meeting, beginning with the first progress review after the A-exam. After the formal meeting, the advisor leaves and the student meets with the committee chair privately.

Document Summary:

Meeting	Advisor Presence	Advisor Letter	Supplement (Forms Appendix)
1st Progress Review	yes	no	A
A-Exam	yes	no	none required
Subsequent Reviews	optional	required always	A and B (yr 3 and 4) or B and C (yr 5+)
Thesis Defense	yes	no	none required



The Committee Meeting.

The student's committee members are encouraged to attend his or her BIOC 581/82 seminar to evaluate the student's progress in seminar presentation skills. However, committee members will reserve major questions for the subsequent committee meeting. Beginning in the third year, the progress review meeting will be scheduled by the graduate program administrator for the day after the student's BIOC 581/582 presentation. If, due to scheduling conflicts, the meeting cannot be held the day after the student's seminar, it will be scheduled as early as possible.

The student should arrive at the meeting with an abbreviated, seminar-style presentation of relevant data including figures from the report, prepared to explain any conclusions with original data and observations, and ready to discuss particular difficulties encountered in the research. The committee chair will review the degree requirements checklist and transcript at the beginning of the meeting until all requirements are met and he or she can sign-off on the checklist.

Students approaching graduation are encouraged to focus the progress review meeting on completed and planned experiments that will be part of research articles that remain to be submitted for publication. See Progress Review Supplement C (Plans for completion of experiments) in the Appendix of this handbook for more details.

Each progress review is as important as the initial admission to candidacy examination. If the committee judges that the student is not making progress or exerting sufficient effort, the committee members can recommend to the department chair that the student be placed on research probation or dismissed from the program. However, the primary purpose of the annual progress review is to provide guidance and help for the student's research work. The student should be prepared to take notes of the committee's comments, concerns, and suggestions for discussion with the thesis advisor and, if appropriate, incorporation into future experiments and progress reviews.

Students are encouraged to seek advice from committee members or other faculty as needed. Students or advisors might occasionally find it helpful to have an additional progress review meeting outside of those automatically scheduled after the BIOC 581/582 seminar, e.g., for assistance in dealing with difficult scientific problems or for advice in choosing an effective experimental approach. Any student wishing to schedule an additional meeting should contact his/her committee chair.

Post Meeting Summary.

The committee chair summarizes the meeting in writing. This summary is provided to the student and the advisor and is part of the student's academic record.



Committee Meeting Components.

- (1) Committee members discuss the written progress review document and the advisor's input without the student present.
- (2) The student presents and then answers any committee member questions.
- (3) The student leaves the meeting room and committee members discuss the student's progress.
- (4) The student returns, the research advisor leaves the meeting (if present), and the committee members ask the student about any concerns or comments regarding the advisor.
- (5) All committee members except the committee chair leave. The chair and student remain to discuss the committee's suggestions.
- (6) The committee chair prepares a written summary of the meeting that is shared with all committee members and the student; a copy is added to the student's academic record.

10. ADMISSION TO CANDIDACY EXAMINATION

The admission to candidacy examination (A-exam) occurs at the end of the fourth semester during May or June. Only under special circumstances (e.g, the absence of a committee member or student due to a family emergency or an approved academic activity) will the exam be scheduled later than June 30. The graduate program administrator will schedule the A-exam and inform participants of the date before May 1.

Exam Format.

The A-exam includes a formal written proposal and an oral examination conducted by the student's research progress committee (Chapter 8). This committee will determine the suitability of the student's candidacy for further pursuit of the doctoral degree based on his or her performance on the written and oral portions of the A-exam. The student's overall academic record and research progress also are considered in determining the student's "pass" or "fail."

Written Exam.

The written exam consists of a research proposal on the thesis project that is due on **May 1** of the student's second year. The proposal format is similar to the progress review document, except that more space is allotted and more detail is expected. The proposal should be of a quality that could be submitted to a federal funding agency (e.g., NIH NRSA). Students are encouraged to request feedback from their advisor, other lab members, and the writing center to ensure that the written document is clear and cogent. Preliminary data should be presented in publication-quality figures and diagrams, and there should be no typographical or spelling errors. The proposal **should not exceed 15 pages** (single spaced, font Times 12 or Arial 11), including specific aims, figures and tables, but excluding references and the title page. An abstract is not required. A general overview of the necessary sections is included below. In addition, review of the handouts and lecture material from BIOC 587 (Forms Appendix) will be useful when preparing the document. The committee rubric used to evaluate the A-exam provides additional guidance on committee expectations (Forms Appendix).

TITLE -- A succinct and informative title that describes the proposed research.



SPECIFIC AIMS -- Provide context that allows a reader to understand the rationale for the aims in one or two brief introductory paragraphs. Then for each aim, list the hypothesis to be tested or rationale for the experiments, the key experiments planned, and the expected results (1 p).

BACKGROUND -- Describe the significance of your project in one or two well-written paragraphs. Provide a historical background for your proposed research including major relevant findings by others. This section also can be used to justify the feasibility or appropriateness of the methodology or to be employed (3-5 p).

RESEARCH PLAN -- For each aim, describe the rationale, hypotheses to be tested, the preliminary results (with figures) supporting the feasibility of the aim, and the planned experiments. For each planned experiment, include relevant controls, expected outcomes, interpretations, potential pitfalls, and possible alternative approaches. Include a time line estimating completion of proposed experiments (9-11 p).

REFERENCES -- List cited literature references. References must include complete author lists and full titles (e.g., style of Cell) (no page limit).

The Oral Exam.

The oral portion of the A-exam involves student's research progress committee and is attended by the student's research advisor. The advisor is not allowed to initiate questions during the exam, but can serve as a resource on the topic.

The goal of the oral exam is to test both the student's understanding of the proposed thesis project and his or her understanding of fundamental principles of biochemistry and cell biology and other appropriate subjects. The oral exam involves a formal presentation of the student's proposed research plan in PowerPoint format; an approximately 30 min. presentation should be planned. During and after this presentation, the committee will ask questions related to the proposed project. The committee also may probe more deeply into the student's general knowledge of aspects of his/her project to determine the student's familiarity and overall understanding of his/her research topic. The oral exam is generally 2-4 hours in length. At the conclusion of the oral exam, the committee will decide among three possible outcomes:

1. **Pass.** The written proposal was judged to be a well written, logical, and feasible Ph.D. project, and the student effectively communicated exemplary knowledge in all areas covered during the exam that were deemed to be central to the student's research.
2. **Conditional pass.** The student effectively communicated exemplary knowledge in most areas covered during the exam, but displayed incomplete knowledge or communication of some aspect of the project or the underlying science. In this case, the committee will assign one or more additional brief (usually 2-4 pages) papers on specific topics to improve the student's basic science foundation and to facilitate thesis completion. These reports will be written by the student and submitted to committee members within a short period (usually 1-2 weeks) following the exam. If the reports are acceptable, the student will formally "pass" the oral examination. (In some years, the majority of students are in this category.)



3. **Fail.** If the committee decides that the student has failed the written or oral exam, the student may be dismissed from the Ph.D. program. Alternatively, at the discretion of the committee and in consultation with the department chair, a make-up exam may be scheduled within six months. If the student fails the second exam, the student will be dismissed from the Ph.D. program. Students who fail the candidacy exam can request permission to complete a Master's degree within one year from the date of the candidacy exam. The thesis advisor, the progress review committee, and the department chair must approve this request. A primary consideration in granting this request will be whether the preliminary research already conducted support the likelihood of successful completion of a novel research project within the one-year time frame.

After the exam, the student is provided a written summary of the outcome from the committee chair along with copies of the rubrics used by committee members to evaluate specific exam components.

11. PETITION FOR PH.D. DEGREE CANDIDACY

Immediately following successful completion of the Admission to Candidacy examination, the student must submit a petition through the department chair to the Graduate Council for official approval of his/her candidacy for the Ph.D. degree. Note that this form requires the student to name the "outside" member of his or her thesis committee (Chapter 11).

BCB Program policy is that the petition should be filed prior to the first progress review after the candidacy exam, or the committee chair will be notified that the student has not filed in a timely fashion. University policy requires that approval of candidacy be achieved prior to the end of the 6th semester of residency to obtain continued financial support. A copy of the Petition for Candidacy form is included in the Appendix of this handbook. On the form, the thesis advisor should be listed as the Director of the Thesis Committee, the outside committee member should be a Rice faculty member from another department, the chair of the progress review committee should be listed as the member from within the department, and everyone else on the progress review committee should be listed as additional members.

Students will be allowed to use members of the former Ecology & Evolutionary Biology department as outside members of their thesis committee if the EEB faculty member was named on a candidacy form that was filed prior to July 1, 2014. Students who file after July 1, 2014 should select an outside member of the Rice faculty who does not hold a primary appointment in the BioSciences Department.



12. RESPONSIBILITIES AND EXPECTATIONS FOR BCB GRADUATE STUDENTS AND FACULTY ADVISORS*

Students and advisors are encouraged to periodically discuss relevant items from the list below. These lab-specific topics do not override departmental or university policies or requirements. Regular discussion around these issues may promote education, increase productivity, and avoid misunderstandings.

1. Research and Training

What is the initial project? How flexible is the project direction? How might the project develop or change over the course of training? To what extent are students encouraged or expected to collaborate on additional projects in the lab? How will collaborations outside the lab be navigated? Who in addition to the PI will provide research guidance? What additional formal training (via courses or workshops at Rice or elsewhere) is recommended? What software is needed on the student's computer? What training is required to use instruments within and outside the lab (e.g., SEA, TMC)?

2. Frequency and methods of communication

How often will the student and mentor meet in person? Communicate via email? Who is expected to initiate one-on-one meetings? Will these meetings be scheduled or sporadic? What should students bring to meetings (notebooks, data, etc.)? Does the research group have regular lab meetings? What level of participation in lab meeting discussions is expected? When is it acceptable to miss lab meeting?

3. Preparation of progress reviews, candidacy exam, and thesis documents

Does the advisor have suggestions for possible committee members? What level of input will the advisor provide on written documents and presentations? How much time does the advisor need to provide useful feedback? What is the targeted number of iterations? Who else in the group can provide feedback? Will opportunities for practice talks be provided? What writing and organizational strategies during the course of the project will facilitate preparation of the thesis document?

4. Authorship and publication

What constitutes authorship? How is the order of authors determined on a manuscript or abstract? What is the process for writing manuscripts? In what ways, besides authorship, might a contribution be acknowledged? How is the outlet for publication decided? Is there a specific expectation for a number of manuscripts (published, submitted, and/or in preparation) and the student's authorship position on these manuscripts for graduation? Are there situations (e.g., publications by other groups) that would alter this expectation? Will there be opportunities or expectations for providing feedback on manuscripts of other lab members?

5. Intellectual property

What is the policy for claims on intellectual property and patents? When are claims worth considering? How will pending claims impact when the research can be presented in public forums? What happens to potential monetary benefits of an awarded patent?



6. Notebooks, data, media, strains

What are the laboratory policies for storing, backing up, and sharing notebooks, media, or other information relevant to ongoing and completed projects? How are plasmids, cell lines, and strains cataloged and stored?

7. Common laboratory responsibilities

Which duties are shared among lab members? Which are the student's specific responsibilities? What is the procedure for purchasing materials for research?

8. Mentoring experience

Are there opportunities or expectations that the student gain experience mentoring junior lab members (e.g., undergraduate researchers or rotating graduate students)?

9. Work hours and time management

How many hours per week is the student expected to work in the lab? Does the schedule matter? (E.g., should there be substantial overlap with the hours of the advisor or another lab member?) How should students balance time conducting experiments versus reading relevant literature? Are there advantages or disadvantages to doing some work (e.g., computer work, reading, writing) off site? Which outside activities require consultation with the advisor prior to participation? How much advance notice is required when requesting vacation days?

10. Seminars and conferences

Which seminars in addition to department-sponsored seminars should the student attend? Under which conditions can or should a student travel to a conference? (E.g., only if the student is presenting?) Which specific meetings are most relevant? Who covers costs, and what is covered?

11. Professional development and career planning

What career path is the student considering? What arrangements can be made for participation in internships, workshops, teaching, courses, etc. relevant to possible careers without compromising research training? What is the process in the field of interest for academic and non-academic job searches? Are there individuals in the career path of interest who could be useful resources for the student? A student's plans may change during the training period; this is a good conversation to revisit periodically.

*Adapted from text suggested by a TAMU Faculty-Student Agreement Task Force with input from BCB graduate program faculty, students, and graduates.



13. STUDENT REQUESTS TO SWITCH ADVISORS

Because switching advisors will likely affect progress towards the degree and/or financial support arranged by the previous advisor, students should not consider switching advisors except in extraordinary circumstances. However, in rare cases a student may feel that his or her interests could be better served by working with a different advisor. Requests to switch advisors will be handled on a case-by-case basis. The BCB graduate program will endeavor to assist the student; however, the student bears the ultimate responsibility of finding a new advisor.

Procedure:

1. The student should first discuss issues with the current advisor and attempt to resolve any concerns or problems.
2. If the student feels that issues are insurmountable, he or she is encouraged to request guidance from the BCB graduate advising committee members, the department ombudsperson, or the department chair.
3. If the student still wishes to switch advisors, the student should speak with a faculty member whose research interests are in line with his or her interests, who is willing to serve as the student's advisor, and who has funding to support the student.
4. If the student finds another faculty member willing to serve as his or her advisor, the student should submit a petition to the department chair for approval of the change. This petition must have the endorsement of the new advisor.
5. If the department chair approves the switch, the graduate program administrator will process the paperwork required to change advisors.
6. If a student changes advisors prior to achieving candidacy, the new advisor and the student may wish to petition the graduate advising committee to request a short delay in the timeline for completion of the admission to candidacy exam.



14. DISPUTE RESOLUTION

Grievance Process.

Problems or conflicts may arise during a student's graduate education, and students must take responsibility for informing faculty. Depending on the problem, students should feel free to ask for advice from their advisor, members of their progress review committee, the departmental ombudsperson (page i), or any faculty member with whom they feel comfortable. It is best to move to resolve any conflicts quickly and amicably. However, if attempts to resolve a problem informally are unsuccessful, the following grievance procedure should be followed:

1. The student should submit the grievance in writing to the department chair, who will attempt to resolve the problem.
2. If the student remains unsatisfied, the problem should be presented for resolution to the BCB graduate grievance committee (page i). If a member of this committee also serves as the student's advisor or on the student's research progress committee, the student may ask the chair for an alternate pro tem committee member. Both the student and the chair should submit a written record of their view to this committee.
3. If the student remains unsatisfied with the resolution of the issue, the problem should be referred to a standing subcommittee designated at the Graduate Council and composed of three faculty members (representing diverse disciplines within the University), one graduate student, and the dean of graduate studies. A written report of proceedings at stage two should be presented to the chair of the Graduate Council, for forwarding to the subcommittee, together with all other written materials generated during the investigation. The decision of this subcommittee will be final.

Petitions and Appeals.

Graduate students may petition for exceptions to academic requirements, regulations, and judgements by following the procedures outlined in the Rice General Announcements (<https://ga.rice.edu/graduate-students/rights-responsibilities/dispute-resolution/>).

Assault, harassment, discrimination.

Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment or gender discrimination to seek support. There are many options available on and off campus for graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university. Title IX of the Higher Education Amendments of 1972 prohibits discrimination on the basis of sex in education programs and activities. Additional resources at safe.rice.edu.

Students should be aware when seeking support on campus that most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can support the student. The therapists at the Rice Counseling Center and the doctors at Student Health Services are confidential, meaning that Rice will not be informed about the incident if a student discloses to these staff members and requests confidentiality. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis. If you need assistance or simply would like to talk to someone, please call Rice Wellbeing and Counseling Center, which includes Title IX Support: (713) 348-3311.



15. THE GRADUATE SEMINAR: BIOC 581/582

Beginning in the second year, students are required to present an annual research seminar in BIOC 581/582, which currently meets on Mondays at 2:00 pm. Attendance is required in all semesters of residence. In the semester of the thesis defense, advanced students who have their thesis outline approved by their committee and who have scheduled their defense time and date with the Office of Graduate Studies are not required to give a 581/582 seminar. Students are encouraged to participate actively in the discussion period that follows the formal presentations.

There are three goals of this course:

- to provide a forum for graduate students to gain expertise in presenting a scientific seminar
- to provide exposure to other ongoing research in the department
- to develop critical analysis skills by evaluating the seminars of other students

Research seminars should be 25-30 minutes in length and are followed by a question period. Seminars should be presented in a format appropriate for a scientific meeting or regular departmental seminar, and include a brief background to the field and the specific research, a summary of relevant research results and conclusions, a discussion of possible future work, and acknowledgments.

While the primary audience for BIOC 581/582 is the graduate student body, students are encouraged to open their seminars to faculty, staff, and postdoctoral fellows as a way of broadening the potential feedback and discussion. The student's progress review committee is encouraged to attend the BIOC 581/582 seminar. This allows the committee the opportunity to gain a broad overview of the project and may eliminate the need for a second presentation during the progress review. Committee members will reserve major questions for the progress review meeting. For more information about preparing a BIOC 581/582 seminar see Dr. Janet Braam or Dr. Mary Purugganan.

Attendance policy.

Four or more unexcused absences in the semester (without a documented illness, emergency, or other excused absence) will result in a grade of unsatisfactory in the course, which in turn will result in academic probation. Please request excused absences well ahead of time (e.g., the preceding Friday) via an email to the instructors and include a reasoned justification for the request. Copy the graduate program administrator on the excused absence request. Arrival to class more than 5 minutes late will be considered an absence.

Seminar Evaluation.

A copy of the seminar evaluation form can be found in the forms appendix of this handbook. Satisfactory completion of the seminar evaluation form is required for receiving participation credit for each seminar and requires inclusion of at least 3 substantial statements or questions.



16. FINAL PHD THESIS EXAMINATION COMMITTEE

The University committee for the final oral examination (defense of thesis exam) must be approved by the Office of Graduate and Postdoctoral Studies at the same time as the candidacy is approved (Chapter 11). This committee is composed of the thesis advisor, the members of the Research Progress Committee, and a Rice faculty member whose primary appointment is outside the BioSciences department. This latter member must be chosen in consultation with the thesis advisor and the department chair. The “outside” member must be selected prior to filing the petition for approval of candidacy (Forms Appendix) and be approved along with the other committee members by the Graduate Council.

Students will be allowed to use members of the former Ecology & Evolutionary Biology department as outside members of their thesis committee if the EEB faculty member was named on a candidacy form that was filed prior to July 1, 2014. In addition to these required members, the student may elect to have an “external examiner” from another university also serve on the committee. In such cases, the department chair must secure the approval of the Office of Graduate and Postdoctoral Studies for the addition of an “external examiner” to the committee.



17. PREPARATION AND FINAL ORAL DEFENSE OF THE PHD THESIS

During the final progress review examination, the student must convince the committee members that the thesis research is essentially complete and of sufficient merit and originality to be published in a reputable scientific journal. This final review session may be held any time prior to or in conjunction with the regularly scheduled, annual progress review. In addition to the usual written progress report, the student submits a detailed thesis outline (approved by the research advisor) one week prior to the meeting. As in the case of a regular progress review, the research advisor submits a written evaluation of the student's progress. Again, the meeting cannot be held if this report has not been submitted. If all committee members and the thesis advisor are in agreement, the student can begin the preparation of his/her thesis. However, during the writing of the thesis, the need for further experimentation often occurs, and the student should be aware of these possible complications and make allowance in scheduling the final examination.

It is essential that students publish most or all of their thesis research in peer-reviewed journals. A strong publication record is the most important metric by which research accomplishment is evaluated, and is necessary for a student to establish a scientific career following the receipt of the Ph.D. Graduates from the Biochemistry and Cell Biology Graduate Program generally co-author more than two papers during their graduate career. Students should not plan to defend their thesis until the bulk of their research has been accepted for publication.

The requirements and format of the written thesis are set forth by the Office of Graduate Studies. It is to the student's advantage to be fully aware of these requirements before undertaking the writing process. The title page should list the thesis advisor first, then the remaining committee members should be listed in alphabetical order. Do not designate the chair of the progress review committee as "chair" on the title page. The thesis advisor should read at least one preliminary draft of the thesis and must approve the final copy before distribution to the four other committee members. **For the examination, the final copy shall consist of a printed manuscript, which, if accepted, could be bound and submitted without editing to the Office of Graduate and Postdoctoral Studies.** The final copies must be submitted to the thesis committee members, along with a pdf copy to the graduate program administrator, at least two weeks before the final examination. In order to participate in the commencement ceremonies at the end of the academic year, the committee members must approve the final copy of the thesis before the deadlines imposed by the Office of Graduate and Postdoctoral Studies.

The arrangement of chapters is determined by the student in consultation with the advisor. Most theses begin with an "Introduction" chapter that reviews the relevant literature and end with a "Conclusions and Future Directions" chapter that discusses the broader implications of the findings. For chapters that include collaborative experiments, be sure to appropriately acknowledge the contributions of others at the start of the chapter, in the relevant figure legends, and/or in the main text.



For chapters that are largely based on published research, indicate the publication on the first page of the chapter (e.g., "Parts of this chapter have been published in XX").

The student is responsible for scheduling the thesis defense and reserving a room, in consultation with the graduate program administrator. Generally, a 2-hour block of time is sufficient for the lecture and subsequent examination. The final thesis defense seminar is public, and the student must arrange to have it announced in the Rice events calendar at least two weeks before the scheduled date. To do this, the student must post the event online through the Office of Graduate and Postdoctoral Studies.

The final thesis examination consists of two parts.

(1) Initially, the student presents an hour-long public lecture that is handled like a departmental seminar, followed by questions from the audience.

(2) Following the public defense, the examination continues with just the thesis committee and the student.

The student leaves the room before and after the exam while the committee deliberates.

The student is expected to defend in detail his/her research work and the text of the written thesis. The committee members will consider both the student's research work and the final copy of the thesis. If the committee members approve the student's performance and the text of the thesis, they sign the Approval of Candidacy Form, which must be brought to the examination by the student. The student should obtain this form from the graduate program administrator prior to the defense. In the case of an unsatisfactory performance, a second examination can be scheduled. A second unsatisfactory performance will result in dismissal from the program.

Deadlines.

The final copy of the thesis must be approved by committee members prior to any deadlines imposed by the Office of Graduate Studies for the student to participate in commencement exercises. Rice University requires the thesis to be defended before the end of the 16th semester of residency at Rice. However, the BCB program may terminate the stipend at the end of the 15th semester of residency at Rice in cases where the progress review committee and the faculty advisor believe the student has had ample time to complete the thesis. The student will receive advance warning that the stipend will be discontinued.



18. MASTER OF ARTS DEGREE PROGRAM IN BIOCHEMISTRY & CELL BIOLOGY

The course requirements for a candidate for the Master of Arts degree will be determined by the Graduate Advising Committee. As in the case of Ph.D. candidates, all students complete (unless equivalent educational experience has been obtained previously) the following courses:

BIOC 301 Biochemistry (fall, prerequisite, does not count for graduate level credit)
BIOC 341 Cell Biology (fall, prerequisite, does not count for graduate level credit)

All Ph.D. students are required to take the following graduate courses:

BIOC 575 Introduction to Research (fall, 1 hr)
BIOC 581, 582 Graduate Research Seminars (fall & spring, 1 hr per semester of residence)
BIOC 583 Molecular Interactions (fall, 4 hr)
BIOC 587 Research Design, Proposal Writing, and Professional Development (summer, 3 hr)
BIOC 588 Cellular Interactions (spring, 4 hr)
UNIV 594 Responsible Conduct of Research (fall, 1 hr)
BIOC 701,702 Graduate Lab Research (1st year rotations) (fall & spring, 2 hr/course; 4 hr/semester)

Students also must take 6 credit hours from the following advanced courses:

BIOC 523 Extracellular Matrix (3 hr)
BIOC 524 Microbiology and Biotechnology (3 hr)
BIOC 525 Plant Molecular Genetics and Development (3 hr)
BIOC 530/535 Graduate Laboratory Modules in Molecular Biophysics (2 hr each)
BIOC 540 Metabolic Engineering (3 hr)
BIOC 544 Developmental Biology (3 hr)
BIOC 545 Advanced Molecular Biology and Genetics (3 hr)
BIOC 547 Experimental Biology and the Future of Medicine (3 hr)
BIOC 550 Viruses and Infectious Diseases (3 hr)
BIOC 551 Molecular Biophysics (3 hr)
BIOC 552 Structural Biology (3 hr)
BIOC 555 Computational Synthetic Biology (3 hr)
BIOC 558 Advances in Nuclease-Mediated Genome Engineering (3 hr)
BIOC 560 Cancer Biology (3 hr)
BIOC 570 Computation With Biological Data (3 hr)
BIOC 571 Bioinformatics: Sequence Analysis (3 hr)
BIOC 572 Bioinformatics: Network Analysis (3 hr)
BIOC 580 Protein Engineering (3 hr)

Students may also take additional advanced level courses in biochemistry and cell biology and other select graduate courses at Rice, Baylor College of Medicine, University of Houston, or University of Texas Health Science Center.



The specific courses will be determined in consultation with the Graduate Advising Committee. There will be an evaluation of previous course studies, and any deficiencies must be corrected, usually in the first year. Once the student selects a thesis advisor, the advisor may require additional specialized course work.

Students must achieve a minimum overall average of B- (≥ 2.67) in the formal biosciences courses to be a candidate for the M.A. degree. The BCB faculty will evaluate the student's overall performance after the second semester in residence.

One progress review will be held for M.A. students during their second full year of residence. This research review session is similar to the admission to candidacy examination for Ph.D. students and requires an 8-10 page description of the student's research activities and plans. No other preliminary examination will be held prior to the final oral defense of the written Master's thesis. As in the case of Ph.D. students, a petition for approval of candidacy is submitted to the Office of Graduate and Postdoctoral Studies along with the names of the thesis committee members. These members include the thesis advisor and the Progress Review Committee. The department chair must approve this action. Master's degrees must be completed by the fifth year of residency, according to university policy. In order to attend commencement at the end of the academic year, the student must submit a petition for candidacy prior to deadlines listed each year in Rice's academic calendar (<https://registrar.rice.edu/calendars>).



19. FINAL ORAL EXAMINATION AND THESIS FOR MASTER'S DEGREE

Master of Arts degree candidates are required to submit a formal written thesis that is consistent with the format and requirements set by the Office of Graduate and Postdoctoral Studies. It is to the student's advantage to be fully aware of these requirements before undertaking the writing process. **For the examination, the final copy shall consist of a printed manuscript, which, if accepted, could be bound and submitted without editing to the Office of Graduate and Postdoctoral Studies.** A final copy of the thesis, which has been approved previously by the major advisor, must be submitted to each of the other committee members one week prior to the final oral examination (thesis defense).

The student is responsible for scheduling the thesis defense and reserving a room, in consultation with the graduate program administrator. Generally, a 2-hour block of time is sufficient for the lecture and subsequent examination. Additionally, the thesis defense is public and notice of the final examination for a Master's degree must be posted with Graduate Studies (via this form: <https://events.rice.edu/rgs/>) and the BioSciences department at least one week prior to the scheduled date. After this announcement is submitted, the graduate program administrator automatically obtains the approval of master's candidacy form from the Office of Graduate Studies. The student must bring the master's candidacy form to the defense.

The final oral thesis examination consists of two parts:

- (1) Initially, the student presents an hour-long public lecture that is handled like a departmental seminar, followed by questions from the audience.
- (2) Following the public defense, the examination continues with just the thesis committee and the student.

The student is expected to defend in detail his/her research work and the text of the written thesis. The committee members will consider both the student's research work and the final copy of the thesis. If the committee members approve the student's performance and the text of the thesis, they sign the approval of master's candidacy form. As in the case of Ph.D. candidates, the final copy of the thesis must be approved by the official committee members prior to any deadlines imposed by the Office of Graduate Studies in order for the student to participate in commencement exercises. In the case of an unsatisfactory performance, a second examination can be scheduled. A second unsatisfactory performance will result in dismissal from the program.



20. BA-MA-PHD PROGRAM IN BCB

Degree Requirements for BA-MA-PhD Degree Track in Biochemistry & Cell Biology

Admission. Qualified Rice University undergraduates can apply to enroll in the Biochemistry & Cell Biology BA-MA-PhD program track in the spring of their sophomore year. Some course requirements for graduate studies are completed at the same time as the upper-level undergraduate degree requirements. Laboratory research performed in undergraduate and graduate research courses is presented as the MA thesis in the summer following graduation and can serve as the initial phase of the Ph.D. thesis work. As a result, the graduate careers of these students will be accelerated by an anticipated 1-2 years, and such students may be able to obtain their Ph.D. degrees approximately 3 years after obtaining their BA-MA degree. If circumstances require, students may stop at the BA or MA level if they meet all the requirements for the respective degrees.

Criteria for selection include academic performance (GPA \geq 3.5), motivation, previous research experience, and personal qualities. Enrollment is limited, and the BCB BA-MA-PhD Track Committee will select applicants for admission.

BA in Biochemistry and Cell Biology Requirements. All of the requirements for a BA in Biochemistry & Cell Biology are required for the BA-MA-PhD track.

MA in Biochemistry and Cell Biology Requirements. The BA-MA-PhD Track Committee will advise students pursuing the BA-MA completion and will approve the formal course program of students during their final two years in the BA-MA program. Students who wish to pursue the BA-MA track must select the MA thesis advisor by the end of the sophomore year when they declare their major to provide the opportunity to begin a project that will form the basis of the MA thesis.

For the MA, the following courses must be completed or evidence provided of successful completion of courses that covered the same material with a B- average or better (GPA \geq 2.67):

BIOC 581/582 Graduate Research Seminar (4 semesters attendance, 1 presentation)
BIOC 583 Molecular Interactions
BIOC 587 Research Design, Proposal Writing, and Professional Development
BIOC 588 Cellular Interactions
UNIV 594 Training in the Responsible Conduct of Research
BIOC 800 Graduate Research



In addition students must take 6 credit hours from the following set of advanced courses:

Students also must take 6 credit hours from the following advanced courses:

- BIOC 523 Extracellular Matrix (3 hr)
- BIOC 524 Microbiology and Biotechnology (3 hr)
- BIOC 525 Plant Molecular Genetics and Development (3 hr)
- BIOC 530/535 Graduate Laboratory Modules in Molecular Biophysics (2 hr each)
- BIOC 540 Metabolic Engineering (3 hr)
- BIOC 544 Developmental Biology (3 hr)
- BIOC 545 Advanced Molecular Biology and Genetics (3 hr)
- BIOC 547 Experimental Biology and the Future of Medicine (3 hr)
- BIOC 550 Viruses and Infectious Diseases (3 hr)
- BIOC 551 Molecular Biophysics (3 hr)
- BIOC 552 Structural Biology (3 hr)
- BIOC 555 Computational Synthetic Biology (3 hr)
- BIOC 558 Advances in Nuclease-Mediated Genome Engineering (3 hr)
- BIOC 560 Cancer Biology (3 hr)
- BIOC 570 Computation With Biological Data (3 hr)
- BIOC 571 Bioinformatics: Sequence Analysis (3 hr)
- BIOC 572 Bioinformatics: Network Analysis (3 hr)
- BIOC 580 Protein Engineering (3 hr)

Students in the BA-MA track are required to register for and participate in BIOC 581/582 both semesters during their junior and senior years and present their research at least once. Students generally enroll in BIOC 800 during the summer between the sophomore and junior year, BIOC 587 and BIOC 800 during the summer between the junior and senior years, and BIOC 583 and BIOC 588 in their senior year.

Students will be responsible for the content of these courses in their MA defense (which also serves as the Admission to PhD Candidacy examination).

Progress reviews with the MA thesis committee occur at the end of the junior year and the early spring of the senior year. The MA thesis will be submitted and public oral defense will occur in the summer following graduation at the end of the senior year with completion of the BA requirements. MA candidates continuing to the Ph.D. must maintain a GPA ≥ 3.0 , complete a thesis, and make a public oral defense that includes a private examination by their MA thesis committee. Students who complete the MA requirements with a GPA ≥ 2.67 but less than 3.0 must defend their thesis to complete the MA degree, but will not be admitted to the Ph.D. program.



PhD in Biochemistry and Cell Biology. The following are required for admission to the Ph.D. portion of the BA-MA-PhD track: Successful completion of the MA thesis and oral defense, which will serve as the admission to candidacy exam required for all PhD candidates, a cumulative GPA ≥ 3.0 for the BA-MA degree courses, and a GRE Quantitative test score \geq 80th percentile. Students who are in good standing in the BA-MA track and have passed their MA final oral exam may begin their doctoral studies the summer following graduation with the approval of their Ph.D. mentor and the department chair.

Course requirements for the first year of Ph.D. study include:

BIOC 581/582 Graduate Research Seminar (required in all years of residency)
BIOC 599 Graduate Teaching (two semesters)
BIOC 800 Graduate Research

Evaluation of Progress in the PhD Phase of the BA-MA-PhD Program. The Graduate Advising Committee evaluates each student's record and recommends any further course work based on the requirements and on the interests of the student. Thesis advisors may require additional courses. At the end of each semester, the department chair, in consultation with the faculty, reviews student performance in the formal course work. Students must maintain at least a B average (GPA ≥ 3.0), perform satisfactorily in their research efforts, and demonstrate outstanding motivation and potential for research. Evaluation during the Ph.D. phase of the program includes:

- The MA thesis and its oral defense constitute the admission to candidacy examination
- Ongoing review of research progress by the thesis advisor; satisfactory research progress will be indicated by a grade of "S" in BIOC 800 each semester
- A yearly research progress assessment by the student's Research Progress Review Committee
- Presentation of research progress at least once a year in seminar format (BIOC 581/582) starting in the first year of Ph.D. study and continuing until submission of the doctoral thesis
- Defense of the Ph.D. thesis research and text in a final public seminar presentation and oral examination attended by the student's Thesis Committee

Students in this program who progress from the MA degree into the doctoral program are governed by the same policies and procedures as all other doctoral students in the Biochemistry & Cell Biology program. Therefore, these students should refer to the appropriate section in this handbook for additional details about post-candidacy processes like evaluation of research progress, participation in the BIOC 581/582 seminar, and the thesis defense.

21. INDIVIDUAL DEVELOPMENT PLAN (IDP)

The American Association for the Advancement of Science has an online tool to help young scientists set and manage career goals. The Department of BioSciences recommends that all doctoral students take advantage of these online tools at <http://myidp.sciencecareers.org>.



22. BIOSCIENCES TEACHING AND MENTORING TRAINING PROGRAM

The BioSciences Department offers a set of optional activities for graduate students and postdoctoral researchers interested enhancing and documenting their teaching and mentoring experiences at Rice. Prerequisites for program participation include successful completion of the Admission to Candidacy Exam (for graduate students) and a letter of support from the research advisor (for graduate students and postdoctoral researchers). Progress must be documented on the Record of Training Activities form. [Program guidelines and the Record of Training Activities](#) form can be found on the BioSciences website, under the Graduate Studies menu. For students wishing additional formal pedagogical training, the Rice Center for Teaching Excellence offers an accredited "Certificate in Teaching and Learning" (<http://cte.rice.edu/for-graduate-students-postdoctoral-scholars/>) that can be completed with advisor permission.

23. TEACHING ASSISTANT APPOINTMENTS

BIOC 599

Second-year students are required to enroll in two semesters of BIOC 599, Graduate Teaching in Biochemistry & Cell Biology, wherein they act as teaching assistants. In BIOC 599, students gain training and experience in teaching by serving as discussion leaders and graders in undergraduate courses. Prior to teaching, students are required to attend departmental and university training workshops to learn the expectations, regulations, and strategies for effectively working with undergraduates. Course assignments for teaching assistants are decided by the department chair with input from course instructors, advisors, and students. Efforts are made to match students to courses that strengthen their foundational skills.

BIOC 115

Post A-Exam graduate students have the opportunity to volunteer for additional teaching experience by serving as lead instructors in BIOC 115. BIOC 115 is a freshman seminar that introduces freshmen to biosciences research at Rice and the Texas Medical Center. Freshmen read and discuss scientific literature and tour Rice and Texas Medical Center labs to see facilities and meet faculty and students. The goals of this seminar are to introduce freshmen to the excitement of research while providing interested graduate students a venue to hone their teaching skills in a small class setting (5-8 students). Graduate students serve as course instructors in a mentored, but independent, format over seven weeks. Student instructors must have the consent and support of their thesis advisors to participate. Student instructors are listed as the instructor of record and receive official Rice teaching evaluations.

Additional Teaching Opportunities in BioSciences

BCB graduate students have the opportunity to gain additional teaching experience throughout their tenure at Rice by serving as teaching assistants in the third year and beyond. Teaching assistantships are valuable training opportunities that help prepare students for future roles as instructors and mentors. Teaching also offers training opportunities broadly applicable for careers in academia and beyond (e.g. leadership, subject mastery, presentation and public speaking skills, establishing goals and expectations, and evaluating others' performance).



24. TRAVEL AND ATTENDANCE AT SCIENTIFIC CONFERENCES

Students are encouraged to participate in national and international scientific conferences. Participation enables students to present their work to a wide audience, listen to research presentations from a range of speakers, and meet with individuals sharing common research interests. Students also use these meetings to network with future collaborators and employers. To expedite attendance, funds may be available to partially defray the costs of such travel. These funds are available to students who will present their research (oral or poster). Calls for applications for the BioSciences Graduate Student Travel Award are generally issued twice a year (early Spring semester and at the start of each school year), but applications may be submitted on a rolling basis (Appendix). Students should ask their research advisors if they recommend a particular conference. Most conferences have travel awards sponsored by the conference association. Students are expected to apply for conference travel awards and awards from other Rice sources such as the IBB and Women in Natural Science (WINS) in addition to applying for department funds. Failure to apply for external awards could reduce chances of receiving departmental travel funds.

For conferences and other travel, it is **essential** to communicate plans with the graduate program administrator for travel guidelines and assistance **before making travel arrangements, even if one will be using the advisor's or other Rice funds**. Whether students receive travel funds from the department, training grant, outside fellowship, or the advisor, travel guidelines must be followed. Reviewing these guidelines in advance will prevent misunderstandings regarding costs that are reimbursable versus costs that are considered personal and cannot be reimbursed. The graduate program administrator helps students make travel purchases in advance, limiting a student's out-of-pocket costs, and is the primary resource for travel reimbursement. Students are not allowed to use per diem on student travel in the BioSciences Department. If students have travel that is funded by a research grant or fellowship that requires per diem, students can request an exception to this rule **prior to traveling**.

25. SEMINARS AT RICE

Graduate students are required to attend the Vanzant Seminar Series in Biochemistry & Cell Biology, usually scheduled on Mondays. Visiting scientists share their latest findings, and students can sign up for lunch with the seminar speaker. The graduate students can nominate speakers for the seminar series; nominations are solicited through the BCB GSA. Graduate students are encouraged to attend other scientific seminars in their field of interest such as the Keck seminars Friday at 4 pm, other seminars hosted by various Rice departments and programs, and Texas Medical Center seminars.



26. INTERNSHIPS

Internships in biotech, other industries, hospital/clinical, or government laboratories can help students explore potential career interests, may add skills that can assist with the Ph.D. work, and can result in post-Ph.D. job offers. For training grants requiring an internship, internship support and placement can be grant-specific. In any case, participating in an internship will require proactive planning and organization by the student.

Guidelines:

- Preparation – Networking is key - take advantage of networking opportunities at conferences and other venues. The Rice Center for Career Development (CCD) compiles web resources including internship listings via joinable Owl-Space sites. The CCD also runs useful workshops and schedules individual meetings. Prepare and get feedback on a professional resume. Talk with BCB students who have completed internships, who are often happy to share their insights. (Consult the graduate program administrator for names of previous internship participants.)
- Permission - Internships are allowed if the student and advisor are in agreement that the experience will be a valuable component of the student's professional development. Once the student has a general plan and timeline for a potential internship, he/she must secure approval from the advisor.
- Content - The internship should bring a new aspect to the student's training or it is unlikely to be considered more beneficial than earlier completion of the thesis research project.
- Timing and length - Internships are not considered until the candidacy exam has been passed. Discuss with the advisor the advantages of interning early versus late in the graduate training period. Negotiate the optimal internship length with the advisor and the host.
- Logistics - Consider how the internship will be funded, whether to take a leave of absence, and how to integrate a 2-3 month hiatus in the Ph.D. research project without inordinately delaying research in the advisor's laboratory. The location of the internship (local versus remote) will affect housing costs and ability to maintain some presence in the thesis lab. International students must also work with OISS regarding implications for visa status and any necessary additional paperwork before the student is approved to participate in the internship.
- Fellowships - If supported through an individual fellowship (e.g., NSF GRFP, NRSA), consult the office of Graduate and Postdoctoral Studies (GPS) to ensure that the internship is planned in a manner that does not affect eligibility to maintain the fellowship. Some fellowships specifically advertise internship opportunities.
- Technicalities - Consult the graduate program administrator to ensure that the plan conforms to the departmental and GPS rules and procedures in the BCB graduate program handbook and General Announcements.



27. VACATION POLICY

Arrangements for holidays and other time off must be made in advance in consultation with the advisor and must be in compliance with university rules and any guidelines from funding agencies. First-year students should consult with a member of the advising committee or the department chair, in addition to their rotation advisor.

28. MEDICAL LEAVE

Medical leaves and other types of interruptions of study are handled according to the guidelines in the General Announcements regarding leaves, interruptions of study, and withdrawals (<https://ga.rice.edu/graduate-students/>). The Office of Graduate and Postdoctoral Studies provides information on the types of leave available (<https://graduate.rice.edu/leaves>). If a graduate student temporarily cannot fulfill the duties of his or her appointment due to a medical emergency or the adoption or birth of a child, the student may be temporarily released from academic responsibilities as described below.

A student may apply for short-term medical or parental release at any time during the semester. The application form can be found in the Graduate and Postdoctoral Studies form library (<http://graduate.rice.edu/allforms>). Enrollment and stipend support may be continued for up to six weeks or until the appointment expires (whichever occurs first). Graduate and Postdoctoral Studies requests that short-term parental release requests be submitted four weeks prior to the expected start date. Students taking a voluntary short-term release should make arrangements with their advisor and instructors to complete their academic responsibilities in a timely manner.

Students receiving a short-term medical or parental release may also request a 1-semester postponement of graduate program deadlines that occur in the year following the 6-week leave. For example, upon returning to full-time research following the 6-week leave, a student may request a 1-semester delay in an upcoming BIOC 581/582 seminar, progress review meeting, and/or candidacy exam. A student may request deferral of TA responsibilities for one semester. Such requests should be made in writing via email to the graduate program director and copied to the department chair. In subsequent years, the student would be expected to meet standard program deadlines.

We strongly encourage students who are experiencing a medical issue or anticipating the birth or adoption of a child to talk with the director of graduate studies, department chair, and/or assistant department chair to discuss the full range of options that may be available.



29. 1ST YEAR STUDENT MENTORING PROGRAM

Each 1st year graduate student in the BCB program is assigned to a mentoring group with 1 - 2 other 1st year students, 1 - 2 second year students, and 1 post-candidacy student, keeping the size of the groups between 4 and 6 persons. The graduate program administrator arranges for each group to have lunch once per month during the first year. The advanced students serve as volunteer mentors for the group. The volunteer mentors are generally experienced with the mentoring lunch practices and they receive reminders from the Assistant Chair about challenges facing 1st year students during each phase of the year. For example, tips for mentors in the fall include several potential discussion topics that are pertinent during the first 6 weeks of graduate school:

- Coursework and first exams - have they had tests yet? Are they coming up soon? Discuss the level of detail required and give them any tips you have; mostly just encourage everyone.
- First laboratory rotation assignments - acclimating to the lab, putting your best foot forward, lab communication.
- Preparing list of lab preferences for the second rotation - remind students that they should email the faculty about rotating before listing them as a choice. It can be good to touch base again even if they already discussed rotating at the beginning of the year - just send an email saying they are still interested.
- Rotation project presentations - give tips on how fast that 10-minute talk flies by and once again, just be encouraging. The first presentation is always the most difficult.

Although the volunteer mentors do not give details about the discussions to staff or faculty, they report the general discussion agenda to the graduate program administrator and confirm an attendance list after each meeting. Rather than repeating specific conversations, mentors are encouraged to act as liaisons to the faculty and staff by giving general feedback, such as, "The first years are worried about presenting their first rotation project talks. Perhaps one of the advising committee members could chat with them about expectations."

In addition to this formal mentoring program, any student experiencing difficulties is encouraged to talk with the BCB graduate program director, the graduate program administrator, the department chair, or the department assistant chair, who will endeavor to provide assistance. Additional resources are listed in Chapter 30, Student Resources.



30. STUDENT RESOURCES

Center for Written, Oral and Visual Communication (CWOVC)

<http://cwovc.rice.edu/>; (713) 348-4905

Help with writing papers and theses, presentation skills through individual consultations and workshops

Center for Teaching Excellence (CTE)

<http://cte.rice.edu/>; (713) 348-2929

Offers Certificate in Teaching and Learning, TEACH workshops, TA training, teaching consultations, reading groups, and various teaching, learning, and technology workshops

Graduate Student Association (GSA)

<http://gsa.rice.edu/>

Hosts community-building events and represents graduate student interests to the University administration; housing, quality of life resources, and other tips for new graduate students.

Office of Graduate and Postdoctoral Studies (GPS)

<http://graduate.rice.edu/>; (713) 348-4002

Forms, registration information, time boundaries, thesis guidelines, professional development resources, short-term loans, and resources on graduate student life at Rice

Campus resources for students with children

GSA resource compilation for parents (<http://gsa.rice.edu/guide-to-grad-life/family-resources/>)

Human Resources Child Care Resources Page (<http://people.rice.edu/benefits-rewards/other/child-care-resources/>)

Office of International Students and Scholars (OISS)

<http://oiss.rice.edu/>; (713) 348-6095

Support for international students, including visa assistance and advice for living in Houston

Pride @ Rice

<https://ricepride.rice.edu/>

Resources for students and allies of the LGBTQ+ community

Rice Counseling Center

<https://wellbeing.rice.edu/rice-counseling-center/>; (713) 348-4867

Consultation and individual and group mental health counseling for Rice students

Student Health Services

<http://health.rice.edu/>; (713) 348-4966

Preventive and outpatient medical care for Rice students

Student Wellbeing Office

<https://wellbeing.rice.edu/studentwellbeing/>; (713) 348-3311

Advice for students with wellbeing concerns, including tools for managing conflict and academic challenges

Women's Resource Center

<http://women.rice.edu/>

Works to increase awareness of and sensitivity to gender issues



31. LABORATORY NOTEBOOKS AND DATA STORAGE

Notebooks are the primary documentation of what you've accomplished; proper data acquisition and record keeping are essential for all scientific work. A reasonably trained person should be able to read an experiment in your notebook and repeat it without further explanation.

Notebooks and data are the property of the university. Notebooks stay in the lab at all times and remain in the lab after you leave. If we cannot find the primary data, we cannot publish the result. Moreover, funders and publishers require your primary data (including notebooks) to be securely stored by the university beyond the duration of your graduate career. If your advisor agrees, you may make a copy of your notebook for your records and convenience. For additional information, review your material from UNIV 594 (Responsible Conduct of Research).

Consult your advisor about the specific type of notebook to use. Is an electronic notebook allowed or preferred? Should the physical notebook be bound? What are the additional requirements if intellectual property filings are anticipated?

Notebooks

This list is a starting point; consult with your advisor for additional electronic notebook requirements and lab-specific requirements. If you have several unrelated projects, it may be preferable to log them in separate notebooks; consult your advisor for your lab policy.

- (1) Each notebook should begin with a "table of contents" that is updated frequently.
- (2) Each experiment should have a title and date (including the year!).
- (3) The purpose or objective of the experiment should be clearly stated (can be same as title).
- (4) The methods should be presented in an easy-to-follow format.
 - When using a standard method, you can reference a lab manual or other source.
 - Complex experiments should have a flow chart or numerical guide to steps.
 - Simple or often repeated experiments can also be referenced (page #) or outlined.
- (5) The notebook provides a log of notes taken during the execution of an experiment.
 - Calculations should be present for buffers, protein dilutions for gels, etc. These notes are critical for troubleshooting and should be thorough. Do not use paper towels!
 - List sources and lot numbers for chemicals (especially when using an unusual compound).
 - Record the appearance of samples (clear, cloudy, color, etc.)? Always note if something is different than usual.
- (6) Data should be accessible to you and others in the lab as designated by the professor.
 - Experiments should be "completed" in the sense that the data are graphed, labeled, or listed in a format that conveys what the numbers mean.
 - Electronic data (images, movies, spreadsheets) should be logged and matched to a page number in your notebook. Remember that your findings may be published years after you obtain the data; make sure that it is possible for you and your advisor to retrieve the primary data and your methods for obtaining the results.



- (7) Each experiment should have a summary or conclusion.
- Even simple preps (DNA, protein, etc.) should list yields and concentrations.
 - Make an entry even if an experiment fails or is terminated and clearly state the reason. ALL data should be entered, not just the data that fits with your hypothesis or that you think your advisor would like to see. This is what scientific integrity is all about.
 - When possible, interpret the data into clear sentences.
- (8) If you need notebooks that meet the standards for filing a patent, make sure to:
- Write in permanent ink.
 - Use a bound notebook, fill consecutive pages, date all entries.
 - Do not erase or change entries; create a new entry to update old entries.
 - Periodically have someone who is not part of your lab witness and initial, with a date.
 - Consult with your advisor for additional requirements.

Electronic Data Storage

Consult your advisor about how to store and archive electronic data. Is there a lab computer that is backed up where lab data are archived? Does your lab store data on a server or file-sharing service?

Does your advisor provide external hard drives to individuals in the lab?

How should electronic images or files be labeled for storage? Make sure that electronic files are organized and contain sufficient information in file and folder names (date, gene, mutant, etc.) so that you (or someone else) can retrieve the data later.

Electronically stored data should be indexed in your lab notebook.

No data should be stored solely on your personal computer.



32. PROCEDURE FOR LAB ACCIDENTS

Graduate Students classified as a Fellow, Teaching Assistant (TA) and/or Research Assistant (RA) injured in the lab at Rice University are covered under Workers Compensation. Rice Student Health Center does not provide medical services for workers compensation care. Therefore students injured in the lab should not go to Rice Health Services. The following protocol should be used for all lab injuries.

Emergency

Call Rice University Police Department at 713-348-6000 (Do not call 911).

RUPD will dispatch officers to the scene and Rice EMS if needed. In case Houston Fire Department trucks or ambulances are needed, RUPD will meet them at the entrance gates and guide vehicles to the location. Be sure to tell the RUPD dispatcher of your location, and clearly describe the incident.

If the incident involves chemicals, biological material, or radioactive materials your supervisor or someone in the laboratory should contact Rice Environmental Health and Safety at 713-348-4444.

When injury or illness involves a chemical, a Safety Data Sheet (SDS) should accompany the victim to the hospital. A First Report of Injury Form must be filed with the Director of Risk Management, VP for Administration (MS-670). An Accident/Incident Report must be submitted to the department head and Environmental Health and Safety. The form is available on the Environmental Safety website at <http://safety.rice.edu/>.

Administer first aid, if necessary.

Evacuate the area, if necessary.

Non-Emergency

Minor medical injuries/illness occurring in the workplace should be reported immediately to the injured party's supervisor. The supervisor should fill out a First Report of Injury Form (available from Risk Management <http://riskmanagement.rice.edu/> or Environmental Health and Safety <http://safety.rice.edu/>). Submit this form to either Risk Management staff Renee Block at rab@rice.edu or Ana Robledo at arobledo@rice.edu as soon as possible.

If non-emergency medical attention is needed, the student should seek treatment at NOVA Clinic (workers compensation care) located 9563 Main Street. Contact Risk Management for an appointment (x5082). If transportation is not available, a request can be submitted to NOVA to provide transport.



33. GRADUATE STUDENT AWARDS

The BCB graduate program and the BioSciences department recognize students whose performance or accomplishments have been particularly outstanding. Awards are presented for outstanding teaching, service and leadership, and seminar presentations during the previous year. In addition, Schroepfer awards, given in honor and memory of George Schroepfer, Jr., founder of the former Biochemistry Department, are given for outstanding BCB Ph.D. theses and for outstanding BCB research publications during the previous year. A certificate and monetary prize accompanies each award. Recipients from previous years are listed below. Students are only eligible to receive each award once.

George J. Schroepfer, Jr. Award for Outstanding Ph.D. Thesis in Biochemistry & Cell Biology

2005: Rafael Counago
2006: Nikki Delk and Corey Wilson
2007: Wiriya Chiranand and Jeanne Rasbery
2008: Damian Dalle-Nogare
2010: Naxhiely Martínez Ramón
2011: Todd Mollan and Zhao Huang
2012: Magda Walkiewicz
2013: Chelsey McKenna
2014: Curtis Warren
2015: Brian Grindel
2016: Brian Engel
2017: Yun-Ting Kao
2018: Premila Samuel Mohan Dass and Emily Thomas

George J. Schroepfer, Jr. Award for Outstanding Published Research in Biochemistry & Cell Biology

2005: Corey Wilson and Andrew Woodward
2006: Phillip Caldwell
2007: Junhua Pan and Adina Maximciuc
2008: Yu-Chang Tsai
2010: Ivan Birukou
2011: Matthew Peña
2012: Danielle Goodspeed
2013: David Shis
2014: Fengbin Wang
2015: Yusong Guo
2016: Ye Chen
2017: Premila Samuel Mohan Dass
2018: Elissa Tjahjono



Outstanding BCB Student Seminar

2004: Brenton Scott	2013: Aaron Collier
2005: Adina Maximciuc	2014: Brian Engel
2006: Damian Dalle-Nogare, Megan Guelker	2015: James Spurlin
2007: Blair Doneske, Shivas Amin	2016: Alicia Jones
2008: Jeff Crawford, Cassidy Johnson	2017: Ian Campbell
2011: Joseph Faust	2018: Amy Prater
2012: Curtis Warren	

Biochemistry & Cell Biology Excellence in Teaching Award

2004: Phillip Graves, Elizabeth McCormack	2013: Alicia Jones, Justin Harper
2005: Jeff Crawford, Megan Guelker	2014: Emily Thomas, Pierce Young
2006: Shivas Amin	2015: Carlos Origel
2007: Todd Mollan	2016: Thomas Clements
2008: Anu Maharjan, Matthew Peña	2017: Ian Campbell
2010: Chelsey McKenna, Kalie Van Ree	2018: Kathryn Smith
2011: Patricia Chapela	
2012: David Shis	

Biochemistry & Cell Biology Service Award (given 2004 - 2014)

2004: Emily Horton
2005: Jeff van Komen
2006: Damian Dalle-Nogare, Angela Hvitved
2007: Megan Guelker
2010: Todd Mollan
2012: Chelsey McKenna
2013: Erin O'Brien, Andrew Hirning
2014: Brian Engel

BioSciences Leadership Award

2015: Kim Gonzalez, Shannon Carter
2016: Brad Ochocki
2017: Amy Prater, Michelle Sneck
2018: Razan Alnahhas, Patrick Clay



34. BCB GRADUATE STUDENT ASSOCIATION (BCB GSA) CONSTITUTION

The BCB GSA represents the interests of all graduate students in the Biochemistry and Cell Biology Graduate Program. Any graduate student is welcome to discuss matters of concern, introduce new ideas for the graduate program, or suggest community building or career development activities. BCB GSA officers act as liaisons between the graduate students and graduate program administrators. The BCB GSA also organizes monthly events where graduate students can interact socially and academically. All graduate students are encouraged to participate in GSA activities.

Officers

The BCB GSA Officers consist of the President, Vice President, Treasurer, Secretary, GSA Departmental Representative, and Year Representatives. All currently enrolled BCB graduate students are eligible for office. Officers have one planning meeting per semester and other meetings, as needed.

Executive Committee

The Executive Committee consists of the President, Vice President, Treasurer, and Secretary. The Executive Committee coordinates activities of the BCB GSA. Members of the Executive Committee cannot hold another position within the BCB GSA. The Executive Committee has a monthly meeting with the BioSciences GSA advisory faculty and administrators. The Executive Committee works with advisory faculty and staff to improve the graduate program and coordinate GSA involvement in departmental activities such as student and faculty recruiting.

President

This position has a 1-year term and is typically assumed by the previous year's Vice President. Former Presidents may no longer serve on the Executive Committee, but may be Year Representatives. The President has the following duties:

- Lead Executive Committee and Officers meetings.
- Assume responsibility for the operations of the BCB GSA.
- Direct BCB GSA actions with aims to improve graduate education and overall conditions within the BCB graduate program.
- Attend club development training and/or risk management training.
- Coordinate events, including:
 - o Oversee event planning and designate a leader for each event.
 - o Ensure officers become Student Judicial Programs (SJP) certified (as is required)
 - o Work with BioSciences GSA leadership, along with GSA advisory faculty/staff to plan the annual BioSciences Research Symposium.
 - o Aid in graduate student and faculty recruitment efforts.
 - o Recruit candidates for future Executive Committee positions.



Vice President

This position has a 1-year term, and the expectation of assuming the role of President the following year. The Vice President has the following duties:

- Assume the duties of the President in the President's absence.
- Attend monthly Executive Committee meetings.
- Attend club development training and/or risk management training for BCB GSA club registration with Rice Student Activities.
- Assume responsibility for maintaining the BCB GSA vending machines and obtain help from BCB GSA officers for stocking, purchasing, etc.
- Coordinate the PRACTICE program.
- Communicate with GSA journal club speakers, approve the article to be presented, send reminders to graduate students and postdocs, take and submit attendance to the graduate program administrator, along with the article citation.
- Recruit candidates for future Executive Committee positions.

Treasurer

This position has a 2-year term maximum. The Treasurer has the following duties:

- Establish and maintain financial records of credits and debits of BCB GSA monies throughout the year.
- Report the finances of the BCB GSA at each Executive Committee meeting.
- Advise the Executive Committee on budget and other fiscal activities of the BCB GSA.
- Ensure all bills related to BCB GSA activities are paid in a timely manner.
- Coordinate the BCB GSA goggle sale fundraiser and coordinate sales advertisements with BIOC teaching faculty.

Secretary

This position has a 2-year term maximum. The Secretary has the following duties:

- Maintain minutes for all BCB GSA meetings.
- Compile and distribute reports and meeting minutes to officers through the Google listserv and archiving on Dropbox (or related cloud service).
- Maintain records of the BCB GSA in the Dropbox folder.
- Manage access to both the Google group listserv and Dropbox folder.
- Post event dates to the departmental calendar.
- Schedule bimonthly journal clubs and communicate with the graduate program administrator for room and lunch logistics.

Rice GSA BCB Program Representative

This position has a 2-year term maximum. The Rice GSA BCB Program Rep has the following duties:

Represent the BCB GSA at monthly Rice GSA meetings (third Tuesday of each month, 6:30-7pm)

- Determine how the University's GSA Budget is spent and represent the interests of the BioScieces graduate students to the University.
- Forward emails from the Rice GSA listserv to the BCB graduate student listserv.



Year Representatives

These positions have no term limits and there can be more than one representative per class year. First year Representative(s) are chosen by the President and the Vice President at the end of Fall term. Any 1st graduate student(s) can volunteer for the position. First year reps may serve as year reps until their graduation. Any student can volunteer to be a rep in years 2+. The Year Representatives have the following duties:

- Relay the concerns of the students in their class year to the Executive Committee.
- Attend any meetings called by the President.
- Volunteer to host or aid in hosting a BCB GSA event at least once a year.

Elections

A call for nominations (including self-nominations) for new GSA Officers will be made by the President at the first meeting of BIOC 582. Students nominated will be informed by the Executive Committee and asked if they are willing to serve if elected. Elections will be held to choose the officers, and votes will be cast in BIOC 582, typically in February. The current President will notify the BCB GSA and faculty/staff advisors of the newly elected officers.

Turnover of positions

July 1st is as the turnover date for the Executive Committee. Because the position of Secretary and Treasurer can be a two-year term, it is possible to have no turnover every July 1st. There is no turnover date for the Representatives. The current Executive Committee will mentor successors, to prepare for a July 1st takeover.

Sponsoring a BCB GSA semester event

For the success and continuation of these events, it is necessary to follow all Student Judicial Programs (SJP) policies and rules. All BCB GSA events must be held in accordance to these policies:

- Complete Rice University SJP form. Per SJP, it is necessary to bring and post a copy of this form (preferably near any alcohol being served).
- Sponsors are responsible for all items necessary for the event; this includes movies, games, sports equipment, grill etc.
- Purchase/Order food and drinks (abiding by SJP policy and guidelines), or have plan in place to pay for drinks at Valhalla.
- Coordinate with the President for any help necessary.

Anti-Hazing Policy

This organization shall not engage in any form of hazing, as defined by the Code of Student Conduct and any other applicable Rice University rules and regulations.

Nondiscrimination Policy

This organization shall not discriminate against individuals on the basis of race, color, religion, sex, sexual orientation, gender identity, national or ethnic origin, ancestry, age, disability, or veteran status.



35. PRACTICE MENTOR PROGRAM GUIDELINES

The Peer Research Admission to Candidacy Training In Competence Educator (PRACTICE) mentor program was designed and implemented by the BCB GSA to help 2nd year BCB grad students prepare for the A-exam. The program was piloted in the spring of 2015. The BCB GSA Vice President coordinates the PRACTICE mentor program.

The PRACTICE program pairs a 2nd year student with a post-A-exam student to help him/her with the first BIOC 582 presentation, the written A-exam document, and the oral component of the A-exam. At least two additional post-A-exam students serve along with the mentor on a student's PRACTICE A exam committee to give feedback on the presentation. PRACTICE mentors and committee members are generally chosen based on lab affiliation in connection to the 2nd year student's committee membership.

2nd year student responsibilities: The 2nd year student can choose to seek as much or as little help from the mentor as he/she would like. The minimum requirement is seeking advice on the 582 presentation. However, using a mentor does not lessen the work involved. It is the 2nd year student's responsibility to provide a draft of the 582 presentation slides to his/her PRACTICE mentor at least 1 week before the scheduled 582 presentation. Similarly, a draft of the A-exam document should be provided at least 2 weeks before May 1 if feedback on the document is desired. Finally, it is the 2nd year student's responsibility to schedule the practice A-exam with the PRACTICE mentor and committee with plenty of time to make changes to the presentation before the actual A-exam.

It is important to note that getting feedback from your PRACTICE mentor does not lessen the importance of getting feedback from the PI on the document and presentations. Both mentors and PIs can help students prepare for A-exams, but the focus should be on the PI.

*The PRACTICE mentor/committee reserves the right to not attend or assist the 2nd year student if the student allows less than the minimum amount of time needed. PRACTICE Committee members are volunteers; please treat them with respect as they are taking time out of their busy schedules to help.

Component	Deadline for submitting to PRACTICE mentor*
BIOC 582 presentation (required)	1 week before BIOC 582 presentation
A-exam document (optional)	2 weeks before May 1
PRACTICE A-exam presentation (optional)	1 week before A-exam



PRACTICE mentor responsibilities.

Mentors are responsible for guiding each mentee with his/her A-Exam document and presentation. Mentors will help students with format, logic, grammar, and presentation style. Keep in mind, mentors are not writing or making students presentations for them. Mentors should help their mentees and challenge them to improve. Mentors also guide students on the A-exam document, BIOC 582 presentation, and then help them prepare for their Practice A-exam shortly after (ideally) their 582 presentation. The minimum requirement for mentors is helping the 2nd year students with their 582 presentations.

Mentors are solicited as volunteers and then assigned to 2nd year students by the current GSA Vice President.

PRACTICE Committee member responsibilities.

PRACTICE Committee members are required to attend the 2nd year students' Practice A-exam talk. Much like a faculty committee member, PRACTICE committee members should give feedback and ask questions during the talk. In most cases, PRACTICE committee members will be representing their PIs on the student's actual committee, and should thus try reflect the comments/concerns the faculty member would likely have.

PRACTICE Committee members are solicited as volunteers and then assigned to 2nd year students by the current GSA Vice President.

Buddy responsibilities.

Buddies are fellow 2nd-year students who go to one another's practice A-exams and take notes for the presenting student, such as slide 28 "Move this, change figure, spelled wrong etc". The Buddy aspect of the program allows presenters to continue talking to their committee without pausing to write everything down.

PRACTICE program overall goals.

Ideally, this program serves to get all 2nd-year students ready for their A-exams. It has the added advantage of preparing students who do not have any senior grad students in their lab and students in labs where the PI has not recently (or ever) gone through the A-exam process.

Teaching and mentorship.

If a graduate student serves as a mentor or serves on 2 or more PRACTICE committees, doing so counts towards completion of the BioSciences Teaching and Mentoring Training Program.



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MEMORANDUM OF UNDERSTANDING

BIOCHEMISTRY & CELL BIOLOGY GRADUATE PROGRAM RICE UNIVERSITY

1. I have read and agreed to the **Graduate Requirements** for the Biochemistry & Cell Biology Graduate Program, including the GPA standards, course work requirements, and review processes.
2. I understand that I am responsible for meeting several key deadlines, including (1) the deadline at the end of 8 semesters to file for Ph.D. candidacy, which I am only eligible to do after I have passed the candidacy exam (A-Exam), (2) the deadline at the end of the 16th semester for defending my Ph.D. thesis, and (3) the deadline for submitting the final, corrected thesis to the office of graduate studies within 6 months of my thesis defense. I understand that I should turn in my first progress review by August 15 of my first year and my written candidacy exam by May 1 of my second year, unless I have received written notification that my deadlines have been extended.
3. I have read and agreed to the requirements for graduate students at Rice University listed in the Rice University General Announcements. I understand that graduate study in Biochemistry & Cell Biology is a full time endeavor in which I am expected to apply myself totally, and therefore it is not permitted to take outside employment for which financial compensation occurs or is anticipated, to assume outside responsibilities which require significant amounts of time commitment even if not compensated, or to take academic courses or programs in an area outside of those related to the training and degree programs of the BioSciences Department without prior permission from the department chair, the thesis advisor, and the progress review committee. If there are long term health, family or legal situations that prevent me from continuing my graduate education on a full time basis, the situation should be reported as soon as possible to the department chair, the thesis advisor, and the progress review committee.
4. I understand that I am responsible for attending training sessions on safety and ethics, for reading all materials provided on these topics and for following the guidelines and procedures described in the sessions and handouts during my entire graduate career at Rice.

By signing below, I am indicating that I understand and will abide by all of the requirements and responsibilities of the graduate program.

Signature

Printed Name

Date _____

ADVISING FOR 1ST YEAR BCB GRADUATE STUDENTS

Most of the formal courses required in the Biochemistry & Cell Biology graduate program are completed in the first year of residence to allow students to commence thesis research at the end of their second semester. The Graduate Advisory Committee tailors the formal course program for all first-year graduate students. After a student selects a thesis advisor, the faculty advisor may require additional specialized courses. The faculty advisor must approve any optional coursework that the student wishes to complete after the first year.

Students are required to have training in Biochemistry and Cell Biology. If students are missing formal training in these subjects, they are required to take the equivalent background courses during their first year.

The following list includes the BIOC courses most commonly suggested for graduate students and is provided to help students prepare for the advising meeting.

Fall Semester FIRST YEAR Courses (total 14 to 17 hours)

COURSES THAT MAY BE NEEDED TO SATISFY PREREQUISITES:

BIOC 301	Full Term	BIOCHEMISTRY	11:00AM - 11:50AM MWF	3
BIOC 341	Full Term	CELL BIOLOGY	9:25AM - 10:40AM TR	3

REQUIRED COURSES IN THE FALL OF THE 1ST YEAR:

BIOC 575	1st Half	INTRO RESEARCH	during orientation	1
BIOC 581	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 583	Full Term	MOLECULAR INTERACTIONS	02:00PM - 04:00PM WF	4
UNIV 594	Full Term	RESPONS COND RES	12:10PM - 01:40PM W	1
BIOC 701	1st Half	GRAD LAB RESEARCH I		2
BIOC 702	2nd Half	GRAD LAB RESEARCH II		2

FALL COURSES THAT MEET GRADUATE ELECTIVE REQUIREMENTS:

BIOC 523	Full Term	EXTRACELLULAR MATRIX (not offered F18)	10:00AM - 10:50AM MWF	3
BIOC 525	Full Term	PLANT MOL GENETICS & DEVELOPMENT	01:00PM - 02:15PM TR	3
BIOC 545	Full Term	ADV MOL BIO & GENETICS	10:50AM - 12:05PM TR	3
BIOC 551	Full Term	MOL BIOPHYS I	10:45AM - 11:50AM MW	3
BIOC 555	Full Term	COMP SYNTH BIOLOGY (not offered F18)	01:00PM - 02:15PM TR	3
BIOC 570	Full Term	COMP WITH BIOL DATA (not offered F18)	02:30PM - 03:45PM TR	3
BIOC 580	Full Term	PROTEIN ENGINEERING	10:50AM - 12:05PM TR	3

OPTIONAL ELECTIVES REQUIRING BIOE PRE-REQS:

BIOE 508	Full Term	SYNTHETIC BIOLOGY	1:00PM - 2:15PM	1
BIOE 535	Full Term	CELL-BASED THERAPUTICS	10:00AM - 10:50AM	1

OPTIONAL SEMINARS (these are pass/fail, attendance required seminars):

BIOC 537	Full Term	CRYSTALLOGRAPHY SEM	02:30PM – 03:30PM R	1
BIOC 592	Full Term	KECK SEMINAR	03:30PM - 05:59PM F	1
BIOC 593	Full Term	PLANT SEMINAR	12:00PM - 01:30PM W	1

Spring Semester FIRST YEAR Courses (total 12 to 16 hours)

REQUIRED COURSES IN THE SPRING OF THE 1ST YEAR:

BIOC 582	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 588	Full Term	CELLULAR INTERACTIONS	01:30PM - 03:30PM WF	4
BIOC 701	1st Half	GRAD LAB RESEARCH I		2
BIOC 702	2nd Half	GRAD LAB RESEARCH II		2

SPRING COURSES THAT MEET GRADUATE ELECTIVE REQUIREMENTS (CHECK ONLINE COURSE SCHEDULES IN NOVEMBER, MORE MAY BE AVAILABLE):

BIOC 524	Full Term	MICROBIOLOGY & BIOTECHNOLOGY	TBA	3
BIOC 530	1st Half	LAB MOD NMR SPEC*	TBA	2
BIOC 535	2nd Half	X-RAY CRYSTALLOGRAPHY**	TBA	2
BIOC 544	Full Term	DEVELOPMENTAL BIOLOGY	TBA	3
BIOC 547	Full Term	EXPERIMENTAL BIOLOGY & FUTURE OF MEDICINE	TBA	3
BIOC 550	Full Term	VIRUSES AND INFECTIOUS DISEASES	TBA	3
BIOC 552	Full Term	STRUCTURAL BIOLOGY**	TBA	3
BIOC 560	Full Term	CANCER BIOLOGY	TBA	3

*BIOC 530 requires BIOC 551 as a prerequisite or concurrent registration with BIOC 552

**BIOC 535 requires concurrent registration with BIOC 552

OPTIONAL SEMINARS (these are pass/fail, attendance required seminars):

BIOC 537	Full Term	CRYSTALLOGRAPHY SEM	02:30PM – 03:30PM R	1
BIOC 592	Full Term	KECK SEMINAR	03:30PM - 05:59PM F	1
BIOC 593	Full Term	PLANT SEMINAR	12:00PM - 01:30PM W	1

Summer Term FIRST YEAR Courses (total of 15 hours)

REQUIRED COURSES IN THE FIRST SUMMER:

BIOC 587	Full Term	PROPOSAL WRITING	TBA	3
BIOC 800	Full Term	GRAD LAB RESEARCH		12

SECOND YEAR

If your thesis advisor requires additional courses, add those courses and reduce the number of BIOC 800 hours to total 15 hours.

REQUIRED COURSES IN FALL OF SECOND YEAR:

BIOC 581	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 599	Full Term	GRAD TEACHING		1
BIOC 611	Full Term	RESEARCH SEMINAR		1
BIOC 800	Full Term	GRAD LAB RESEARCH		12

REQUIRED COURSES IN SPRING OF SECOND YEAR:

BIOC 582	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 599	Full Term	GRAD TEACHING		1
BIOC 611	Full Term	RESEARCH SEMINAR		1
BIOC 800	Full Term	GRAD LAB RESEARCH		12

SUMMER OF SECOND YEAR AND BEYOND

Summer Term Courses (total of 15 hours)

BIOC 800	Full Term	GRAD LAB RESEARCH		15
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FALL AND SPRING OF THIRD YEAR AND BEYOND

If your thesis advisor requires additional courses, add those courses and reduce the number of BIOC 800 hours to total 15 hours.

Fall Semester Courses (total of 15 hours)

BIOC 611	Full Term	RESEARCH SEMINAR		1
BIOC 581	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 800	Full Term	GRAD LAB RESEARCH		13

Spring Semester Courses (total of 15 hours)

BIOC 611	Full Term	RESEARCH SEMINAR		1
BIOC 582	Full Term	GRAD SEM BCB	02:00PM - 03:15PM M	1
BIOC 800	Full Term	GRAD LAB RESEARCH		13

Biochemistry & Cell Biology Graduate Advising Committee
Course Requirements Checklist

Core Requirements met in undergraduate transcript?		
BIOC 301	Biochemistry	11:00-11:50AM MWF
BIOC 341	Cell Biology	09:25AM - 10:40AM TR

First Year Courses recommended by the Advising Committee			
Fall of Year _____		Spring of Year _____	
BIOC 575 Intro to Research	1	BIOC 582 Grad Seminar BCB	1
BIOC 581 Grad Seminar BCB	1	BIOC 588 Cellular Interactions	4
BIOC 583 Molecular Interactions	4	BIOC 701 Lab Rotation I Spring	2
BIOC 701 Lab Rotation I Fall	2	BIOC 702 Lab Rotation II Spring	2
BIOC 702 Lab Rotation II Fall	2		
UNIV 594 Responsible Conduct	1		
Recommended Elective(s)?		Recommended Elective(s)?	
TOTAL OF 14 – 17 HOURS		TOTAL OF 12 – 16 HOURS	

1st Year SUMMER Courses recommended by the Advising Committee	
BIOC 587 Research Design, Proposal Writing, & Prof Dev	3
BIOC 800 Graduate Research	12

Second Year Courses recommended by the Advising Committee	
Fall of Year _____	Spring of Year _____
BIOC 581 Grad Seminar BCB	BIOC 582 Grad Seminar BCB
BIOC 599 Graduate Teaching	BIOC 599 Graduate Teaching
BIOC 800 Thesis Research	BIOC 800 Thesis Research
BIOC 611 Research Seminar	BIOC 611 Research Seminar
Recommended Elective(s)?	Recommended Elective(s)?

Student Number

Student Name

**BIOCHEMISTRY & CELL BIOLOGY
DEGREE REQUIREMENT CHECK**

Prerequisite-if not met as undergraduate

BIOC 301 Biochemistry
BIOC 341 Cell Biology

Required Course for all PhD candidates

BIOC 575 Intro to Research
BIOC 581 Graduate Research Seminar
BIOC 582 Graduate Research Seminar
BIOC 583 Molecular Interactions
BIOC 588 Cellular Interactions
BIOC 587 Scientific Proposal Writing
UNIV 594 Responsible Conduct of Research
BIOC 701, 702 Graduate Lab Research
BIOC 701, 702 Graduate Lab Research

Any 6 credits of the following advanced courses

BIOC 523 Extracellular Matrix
BIOC 524 Microbiology and Biotechnology
BIOC 525 Plant Molecular Genetics and Development
BIOC 530 NMR Laboratory Module in Molecular Biophysics
BIOC 535 X-Ray Laboratory Module in Molecular Biophysics
BIOC 540 Metabolic Engineering
BIOC 544 Developmental Biology
BIOC 545 Advanced Molecular Biology and Genetics
BIOC 547 Experimental Biology and the Future of Medicine
BIOC 550 Viruses and Infectious Diseases
BIOC 551 Molecular Biophysics I
BIOC 552 Structural Biology
BIOC 555 Computational Synthetic Biology
BIOC 558 Adv Nuclease-Mediated Genome Engr
BIOC 560 Cancer Biology
BIOC 570 Computation with Biological Data
BIOC 571 Bioinformatics: Sequence
BIOC 580 Protein Engineering
Other as approved by advisors

Second year students are required to take 2 semesters of

BIOC 599 Graduate Teaching in Biochemistry

Admission to Candidacy Exam

Doctoral Candidacy on Transcript? (yes/no)

Semester Met	Grade	Undergrad
Semester Met	Grade	
Semester Met	Grade	Credits
Date		

BIOC581/2- Seminar Evaluation

Revised 1/29/18

Print name legibly (front & back) _____ Date _____

Check this box if you believe this seminar should be one of the listed nominees for the “Best Seminar Presentation” Award, voted on in the spring.

Speaker _____

CONTENT: **Excellent** **Good** **Average** **Needs work**
 1 2 3 4 5 6 7 8 9 10

- | | |
|---|--|
| <input type="checkbox"/> Significance was explained | <input type="checkbox"/> Arguments supported by data |
| <input type="checkbox"/> Objective was clear | <input type="checkbox"/> Audience-appropriate content |
| <input type="checkbox"/> Background was appropriate | <input type="checkbox"/> At end, came back to concepts introduced at beginning |
| <input type="checkbox"/> Organization was helpful | |

DELIVERY: **Excellent** **Good** **Average** **Needs work**
 1 2 3 4 5 6 7 8 9 10

- Speaker:**
- | | |
|---|---|
| <input type="checkbox"/> Was enthusiastic | <input type="checkbox"/> Maintained eye contact |
| <input type="checkbox"/> Spoke loudly and clearly | <input type="checkbox"/> Had a good pace |
| | <input type="checkbox"/> Avoided uhs, ums, etc. |

SLIDES: **Excellent** **Good** **Average** **Needs work**
 1 2 3 4 5 6 7 8 9 10

- | | |
|--|---|
| <input type="checkbox"/> Fonts were easy to read | <input type="checkbox"/> Visuals used effectively |
| <input type="checkbox"/> Not too crowded or too sparse | <input type="checkbox"/> Slide titles informative |

QUESTIONS: **Excellent** **Good** **Average** **Needs work**
 1 2 3 4 5 6 7 8 9 10

- Speaker:**
- | | |
|---|---|
| <input type="checkbox"/> Was open & confident | <input type="checkbox"/> Repeated the question for the audience |
| <input type="checkbox"/> Answered accurately | <input type="checkbox"/> Addressed response to all |

Comments explaining ratings above:

Your name _____ Date _____

In order to receive credit, you must contribute at least 3 substantial statements. At least two must be relevant to the science; one may be about presentation, slides, and/or delivery.

Scientific concepts I learned through this seminar:

Scientific concepts I found most interesting:

Scientific concepts I found most confusing or unclear:

Scientific suggestions or questions for speaker:

Other:

RESEARCH PROGRESS REVIEW GUIDELINES

Biochemistry & Cell Biology Graduate Program, Rice University

The following items should be covered during all Research Progress Reviews. A checklist sheet, based on the items below, will be attached to the review meeting summary form that the Chair of the Committee fills out after the progress review. Furthermore, the student and the mentor should each receive a written copy of the Chair's report.

Has the student fulfilled or is he/she fulfilling the course work adequately?

Does the student have significant research results?

Can the student give a clear, concise, and forceful rationale for doing his/her project?

Is the student well motivated to do research?

Are the student's lab skills developing appropriately? Are the student's writing skills developing?

Is the notebook in order? Does it serve as adequate record keeping as required by federal agencies?

Is the student aware of literature in his/her chosen field? Does the student attend department and/or other seminars?

Is the student developing an appropriate sense of ethics in science? Are there concerns expressed by the research advisor?

Is the thesis director paying close enough attention to the needs of the student?

Insufficient overall performance is grounds for placing students on "research probation," and another review should be scheduled within six months. Failure to rectify the problems by that next meeting would be grounds for dismissal under the terms of the "satisfactory progress" rule in the graduate program handbook.



SUMMARY OF RESEARCH PROGRESS REVIEW

STUDENT:

DATE OF PROGRESS REVIEW:

REVIEW COMMITTEE CHAIR:

OTHER MEMBERS OF REVIEW COMMITTEE:

ADVISOR:

ACTION OR DISPOSITION:

PASS

CONDITIONAL PASS

ADDITIONAL MEETING REQUIRED

SUMMARY:

MILESTONES TO BE MET BEFORE NEXT REVIEW:

ADDITIONAL REQUIREMENTS OR ASSIGNMENTS and DEADLINE(S):

Student Self-Evaluation

Supplement A to the Graduate Student Progress Review Report

(For students entering year 2-4)

It is valuable to periodically evaluate how well you are expending your time and to make changes in your behavior that improve your productivity (even after you have your PhD). In addition, it is important to identify ways to effectively engage others in discussions that accelerate your research progress, extend your research skills, and expand your intellectual breadth. Finally, it is vital that you assess what steps you need to take to become an independent researcher who identifies hypotheses that are compelling, testable, and worthy of your valuable time and effort. To help you think about these issues as you proceed through graduate school, you should provide typed answers to the following questions for your advisor and committee prior to your annual progress reviews (no more than one page). You are encouraged to discuss these with your advisor and committee and to ask them for input on the changes you are planning for the upcoming year.

1) How have you divided your time among the diverse activities that are part of your research training over the past year, *i.e.*, reading literature, attending seminars, designing experiments, performing experiments, analyzing data, preparing written and oral presentations, mentoring students, and other activities? Indicate the average number of hours per week that you work and estimate the percentage of time that you spend on these different activities. In addition, express whether you think changes in your time management would be useful for your productivity during the next year, and describe what changes you are planning.

2) What mechanism(s) have you been using to engage others in discussions about research hypotheses, experimental design, data interpretation, data presentation (oral and written), and learning new experimental methods? Indicate the people that you engage, the frequency of discussing these matters, and the mechanisms that have been most productive for you to improve your research progress. In addition, express whether you think there are changes in how you engage people over the next year that would accelerate your research progress.

3) How has your research independence changed over the past year? Indicate whether your research progress is less dependent on others than it was prior to your last progress review. Give examples that illustrate this point by commenting on your independence with respect to the following: designing experiments, solving technical problems, identifying new hypotheses, and writing manuscripts.

Updated C.v.
Supplement B to the Graduate Student Progress Review Report
(For students in year 3 and beyond)

Provide an updated copy of your C.v. along with your progress reviews beginning in year 3. This is an opportunity to receive feedback from your advisor and committee members on the format and content of your C.v., as well as an opportunity to discuss how your various activities might support your ultimate career goals. Use whatever C.v. format you like; below is an optional template.

Name

email

date

Education

Ph.D. student in Biochemistry and Cell Biology (BCB), Department of BioSciences, Rice University, Houston, TX (anticipated graduation, May 2018)

B.S. in X, University of Y, City, State, Country

Honors and Awards

2014 IBB travel grant to attend the Cell Signaling Gordon Conference, Holderness, NH

2013 Outstanding BCB Student seminar

Publications (most people use reverse chronological order)

Authors, date, title, journal, volume, page numbers (PMID)

Manuscripts in preparation

Authors, title (in preparation for submission in October, 2015)

Presentations

Presentation title, conference title, location, date (poster)

Presentation title, conference title, location, date (talk)

Teaching experience

Instructor for Bioc 115, Freshman Seminar in Local Research, Rice University, spring 2015

Teaching Assistant for Bioc 302, Biochemistry II, Rice University, spring 2014

Teaching Assistant for Bioc 301, Biochemistry I, Rice University, fall 2013

Leadership experience

BCB Graduate Student Association Secretary, Rice University (2013-2014)

Student Council Representative, Undergraduate University (2011-2012)

Mentoring experience

Mentored two Rice undergraduates in research projects, including one who is a co-author on my 2013 PNAS publication (August 2013-present; May 2012-May 2013)

Plans for completion of experiments
Supplement C to the Graduate Student Progress Review Report
(For students entering year 5 and beyond)

As you near completion of your PhD, your Progress Review Committee would like to help you focus your remaining time on completing your experiments, publishing your discoveries, and writing your thesis. Please work with your advisor prior to your upcoming committee meeting to provide the information requested below, and fill out and submit this document to your committee as a supplement to your Progress Review document. Although your progress review document should take its usual form, it will be useful to structure your presentation to the committee around questions 2 – 5 below; i.e., show your publication-ready data, show your first attempts at the in-progress experiments, and then outline your remaining experiments for each planned publication.

1. Please list the papers you have submitted, in press, or published. (Include full author list, title, journal, etc.):

2. For each additional manuscript that you plan to submit for publication prior to defending your thesis, please provide
 - A. Tentative title of paper and possible journal to which you plan to submit

 - B. Titles of figures that are completed and publication-ready:

 - C. Tentative titles of figures that have been completed but need to be repeated to obtain publication-ready data:

 - D. Tentative titles of figures for experiments that remain to be performed:

3. By what date do you estimate these experiments will be complete?

4. By what date do you estimate the manuscript(s) will be submitted?

5. By what date do you estimate you will defend your thesis?

6. Are you and your advisor in agreement on items 2 – 5 above?

Admission to Candidacy Exam Evaluation

Biochemistry and Cell Biology Graduate Program, BioSciences Department, Rice University
(This form is to be completed by all committee members and becomes part of the student's file;
copies are provided to the student following the exam)

Student: _____ Date of exam: _____

Please review guidelines for evaluation on reverse and provide comments as needed
(comments are required for "unsatisfactory" components)

	excellent	very good	satisfactory	unsatisfactory
Specific Aims	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Background and Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Preliminary Results	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Research Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Novelty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Document text	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				
Response to questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Comments:</i>				

Summary evaluation

I have read this exam, and recommend: pass A-exam
 conditional pass (see comments above and in summary document from committee chair)
 fail A-exam

Committee member: _____ signature _____

Guidelines for Evaluation of BCB Graduate Program Admission to Candidacy Exam

<i>Specific Aims</i>	Excellent:	Each aim is a logical test of the hypothesis or has clear rationale at its foundation. Hypotheses are soundly based predictions of biological importance and address scientific concepts rather than experimental outcomes.
	Satisfactory:	Aims are clearly stated; a case is made for the work's rationale
	Unsatisfactory:	Aims are not clearly stated; little context or justification is provided
<i>Background and Significance</i>	Excellent:	Identifies all relevant results and techniques from the literature, and synthesizes them in a thoughtful discussion
	Satisfactory:	Discusses major previous works and places them in context for the present project
	Unsatisfactory:	Fails to cite or assimilate previous work
<i>Preliminary Results</i>	Excellent:	Extensive preliminary results with thoughtful discussion
	Satisfactory:	Some preliminary results that are adequately described
	Unsatisfactory:	Limited preliminary results or low quality of discussion
<i>Research Plan</i>	Excellent:	Research plan would be competitive for funding with clear rationales, experimental plans, controls, interpretation of expected results, and alternative approaches
	Satisfactory:	Research plan clear; experiments are technically sound and feasible
	Unsatisfactory:	Research plan unclear, lacks description of controls or rationale, or includes inappropriate level of detail
<i>Novelty</i>	Excellent:	Original research that demonstrates distinct creativity in the question or experimental design
	Satisfactory:	Describes a novel problem appropriate for a Ph.D.
	Unsatisfactory:	Incremental approach unlikely to yield publishable findings
<i>Document text</i>	Excellent:	Good organization, fluent prose, and few grammatical errors; full compliance with formatting guidelines
	Satisfactory:	Decent organization, coherent prose, and limited grammatical errors; full compliance with formatting guidelines
	Unsatisfactory:	Poor organization, incoherent prose, and/or numerous grammatical errors; not in compliance with formatting guidelines
<i>Presentation</i>	Excellent:	Engaging, highly polished presentation with well crafted slides that illustrate key results in the project and clearly describe future directions
	Satisfactory:	Professional presentation on par with a solid conference talk; includes a coherent project narrative and future plans
	Unsatisfactory:	Too much or too little detail; unclear about project goals and direction; incoherent or illegible slides; read from slides
<i>Replies to questions</i>	Excellent:	Complete answers that demonstrate a deep understanding of the discipline that extends beyond the contents of the document
	Satisfactory:	Competent answers that illustrate a facility with the issues and techniques immediately relevant to the thesis project
	Unsatisfactory:	Answers reveal a limited familiarity with the thesis project or its context



* instructions specific to the Biochemistry & Cell Biology Graduate Program are in parentheses

PETITION FOR APPROVAL OF CANDIDACY FOR A DOCTORAL DEGREE (C-2)

Candidacy for the Doctoral degree cannot be approved until the applicant has completed all course requirements, all qualifying or preliminary examinations or department equivalent, and any foreign language requirements.

1. Name of applicant (Last) (First) (M.I.)

2. Department/Graduate program Student ID #

- Attach to this application a current transcript (printed from WebApps; see your graduate coordinator).
Attach to this application a statement of all applicable departmental requirements for both course work and qualifying or preliminary examinations.
Attach student's departmental checklist to candidacy to document how the student has fulfilled departmental requirements.

3. Proposed thesis topic (tentative title)

4. Thesis Committee, subject to the approval of the GPS. (type or print) Please see the General Announcements for rules regarding the composition of thesis committees.

- (a) Thesis Director (your BCB research advisor)
Committee Chair within the department (if different) (BCB does not use this line - advisor chairs the thesis comm.)
(b) Member within the department (your progress review comm. chair)
(c) Member outside the department (Rice faculty from another dept.)

Additional member(s)

*Thesis committees may later be changed. See http://graduate.rice.edu/thesis for additional information.

5. Signatures:

Original signature of Department Chair or Director of Graduate Studies Date

Graduate Coordinator signature Date

Dean of Graduate & Postdoctoral Studies Date

RETURN TO DEPARTMENT COORDINATOR



RICE

BioSciences at Rice
Graduate Student Travel Award Application

STUDENT NAME: _____ STUDENT ID# _____

Name of Conference or Other Purpose of Travel:

Presentation Type (Circle One): POSTER ORAL

Presentation Title (abstract should also be attached to this application form):

Location of Conference: _____

Dates of Travel: _____

Estimated Expenses for this Travel (In the accompanying column, please note the estimated source & amount of funds to cover expenses beyond potential BioSciences travel award)

Table with 3 columns: Expense, Estimated Amount (\$), Other Travel Award, PI Fund, or Personal Funds? and rows for Transportation, Shared Lodging, Registration, Meals, Total.

Source and amount of other meeting/travel awards applied for:

Faculty Advisor Signature: _____

Submit completed application materials (Application form, CV, presentation abstract) to the Graduate Program Administrator. Electronic submissions permitted.

Office Use

Table with 5 columns: Submission Date, Submitted to Dept. Chair, Approval Date, Amount Awarded, Student Notified.



BioSciences Graduate Student Pre-Travel Authorization Form

If you are planning any travel for a Rice- or BioSciences-related reason, you should talk to the graduate program administrator (Rachael Eaton; re11@rice.edu) and complete the following form at least 2 weeks **IN ADVANCE**. Electronic or paper copies accepted.

Student Name: _____

Emergency Contact Information (partner/parent/family member/friend): Name, phone, email.

What is the best way to reach you during this travel, if essential/emergency?

Copy/paste additional entries for 2+ travel locations, as needed

First Travel Location: _____

Travel purpose: _____

Dates of travel to/from this location: _____

Hotel/lodging/host name: _____

Address (city, state, country): _____

Host/colleague email, in case of emergency: _____

Will you request a travel advance?

Yes No

Will you request reimbursements?

Yes No

Reimbursements

Check with Rachael before using personal funds on travel; BioSciences may be able to pay up-front, minimizing reimbursement.

If seeking reimbursements, bring Rachael all **itemized** receipts, along with the fund to use for expense(s) and the reason for the expense. A credit card slip alone is not sufficient; you may need to specifically **request an itemized receipt** from a vendor/restaurant.

Rice is a tax-exempt institution in Texas. We cannot reimburse Texas sales tax or Texas hotel tax; try to ensure none is charged. See BioSciences staff for tax exemption forms that you can take while traveling.

Has your thesis advisor approved all of the travel listed here?

Advisor Signature (or email approval to re11@rice.edu): _____

This completed pre-trip authorization form is important for safety and reimbursement purposes. Failure to complete this form in advance and secure appropriate expense documentation may result in lack of reimbursement for out-of-pocket expenses.

Office Use

Submission Date:	Approval Date:	Expense Reports Submitted:

BIOC 587 Progress Review Guidelines

Understanding Your Subject

It is essential that you completely understand everything that you write. The process of writing a draft often helps in developing your understanding. Organizing a subject into words to explain it to someone else often results in the realization that there is an essential step in the reasoning that you have not considered. Before drafting the text, use an outlining strategy that identifies the main topics of paragraphs and major points that highlight the flow of information. Vaguely worded descriptions of aims, methods, or results do not disguise a lack of understanding.

Expressing yourself clearly

Writing has meaning through the reader's interpretation. Your writing should be clear and concise to facilitate the reader's understanding. Consider whether you have selected the best word for your purpose. Evaluate your writing to identify topic sentences and the flow of information from known-to-new.

Improper grammar and unconventional sentence structure make writing difficult to understand, so it is important to follow standard English rules. This can be challenging for those whose native language is not English, but it is important to work to overcome this difficulty. Use of incorrect English makes communication less effective, both because it is less easy to understand and because there is often a subconscious assumption that improperly expressed ideas are less likely to be valid. Take advantage of spell check and grammar check, which can catch some of your mistakes. The draft that you give to others to critique should be something that you have gone over repeatedly yourself, correcting the weaknesses that you recognize. You may schedule appointments with consultants at The Center for Written, Oral, and Visual Communication to evaluate your writing style. All critiques should include corrections of mistakes in English usage.

Plagiarism

It is absolutely forbidden to copy any portion of any written work (paper, thesis, grant proposal, web page, figure, etc.) in your proposal without referencing the written work. Copying is plagiarism, which is a serious offense, and students have been dismissed the program for this reason. Please consult an instructor if you are uncertain of the definition of plagiarism.

Progress Review Sections

Specific Aims

In a succinct, accessible format, you must gain the reader's interest in your field, convince the reader that your planned research offers something unique to the field,

and defend your research objectives and approach. The specific aims should show that you have a central, testable hypothesis with coordinated research objectives.

This section should be self-contained. It is essential that every concept, technique, phenomenon, or molecule that you introduce in this section be defined so that your committee can understand you. We understand that this section is short, and you must be brief, but if your point is important enough to include in this section, it must be described in enough detail to be understood. If you don't have enough room to describe something sufficiently, consider whether you can leave it out; however, you may still include that information in the background section. You should prioritize the topics you want to discuss, and describe only the most important ones.

This section can be viewed as your proposal in condensed form. Generally, it begins with a paragraph or two (about 1/2 page) that defines and describes the experimental problem, the general question(s) to be asked, the methods to be employed, and how the anticipated results will move the field forward. The specific aims are then listed (as questions, or hypotheses to be tested), followed by two-three sentences of description. The following provides more information about the content of this section:

- a) *Opening text:* Before you start writing, you need to know what your project is about and how it could be stated in 1-2 sentences. Then begin your first paragraph with a definition of the phenomenon you are studying, followed by the reasons why an understanding of the phenomenon is important for biology (or if appropriate, a particular disease). Use the context of previous work to identify a gap in our knowledge or understanding. This gap represents a niche for your research. It is very helpful if this part mentions the data that supports your hypothesis.
- b) *Developing your central hypothesis:* Your next paragraph should develop your hypothesis or model. Clearly state your hypothesis. Then write a sentence that might begin "However, it remains unclear if ..." Then write "To test this possibility," or "To distinguish between these possibilities, I propose to ..." Then "In particular, I will use my experimental approach to make my measurements, which will help determine if my hypothesis is correct." Finally, write that successful completion of these experiments should improve our understanding of your phenomenon in whatever way you think. Finally, write "The following specific aims are proposed:" or another sentence that directly introduces the aims.
- c) *Specific aims:* The Specific Aims themselves are given in a list format, usually with some additional explanation for each aim in the list. Successful proposals are usually limited to 2-4 specific aims, often arranged in order of increasing challenge. Title each aim with a statement of a task to perform or as a question to be answered. Then, identify an objective that is relevant to the research goal with a description of the how the objective is accomplished and why it adds to the research plan. Two formats that help the author

accomplish this are the “To X, we will Y” and the “Challenge, Approach, Impact” outlines for aims.

Background

This is the section in which you describe the previous work related to your experiments. Remember this is a persuasive document. This section is not meant to be a general review of the field. Rather, your job here is to provide your committee with the information they need to assess the significance and feasibility of your experiments. Basically, you want to provide the information needed to appreciate the excellence and importance of your experiments. Therefore, it is your particular experiments themselves that will determine the subject matter that must be included in this section.

Define Your Subject: Your first paragraph should be a definition and introduction of your phenomenon. In this paragraph, it is best to emphasize the part of your phenomenon that is most closely related to what your particular experiments will be testing.

Establish Relevance: The theme of your second paragraph should be why your phenomenon is important to biology, what unanswered questions remain, why it is important to answer these questions, and how your unique approach or hypothesis will enable novel and important information about your phenomenon to be generated. Tell the reviewer why the successful completion of your experiments will advance the field. Keep the subject focused on your proposed experiments. If you are proposing to study the roles of potassium channels in learning and memory, then you should focus on the previous work on potassium channels on learning and memory, rather than digress into other issues, no matter how interesting. Also, be as detailed as possible. It is not very impressive to write: "Potassium channels are important for neuronal function, and because neurons are important for learning and memory, potassium channels are important for learning and memory as well." It is better to write: "Potassium channels are important for learning and memory. For example, Kandel and colleagues (reference) showed that short term synaptic plasticity of the gill and siphon-withdrawal reflex of the sea slug *Aplysia* occurred by the serotonin-induced, cAMP-dependent phosphorylation of the "S" type potassium channel, leading to its more rapid inactivation, which in turn caused increased action potential duration and increased synaptic strength." To write in such detail, you will have to understand your field thoroughly, which means much studying of the literature.

Support Your Hypothesis: Another paragraph should provide the evidence that your hypothesis might be correct. If your hypothesis is a good one, it will be based on some experimental data, rather than pulled out of thin air. Provide all of this evidence that you can; something along the lines of "Smith and Jones (2001) previously showed ... raising the possibility that my hypothesis might be true." might be appropriate. But don't give the impression that the hypothesis is already proven. Therefore, also write what the previous researchers didn't test (what you propose

to test), or other experiments that provide conflicting evidence, showing that the validity of your hypothesis remains an open question. Don't be afraid to tie in what you are writing here to your own proposed experiments. A sentence such as "The experiments presented in aim #2 are designed to resolve these inconsistencies" helps the reader understand why you are writing this.

In all cases, think and write as deeply about the issues that you cover as you are able to. You might explain how your approach has been used successfully in the past. Cite examples from the literature, if possible. This way, the committee will be aware that what you are proposing is feasible because it is based on methods that have been successfully used by others. Try to think of as many objections and caveats as you can, and then try to think of ways in which these can be overcome. If possible, provide examples from the literature of how similar obstacles were overcome by others. If you do this, your reviewer will think that you are on top of things, have thought things through, and will be able to deal with whatever complications or hurdles you might encounter during your experiments. In contrast, if you are superficial in your descriptions and conclusions, your reviewer might think that you will be equally superficial in the performance of your specific aims and is less likely to fund you.

End this Section: You will want to conclude with a paragraph tying together your anticipated results with what has been discovered previously in your field. This is your chance to display your vision of the field, and how you intend to contribute to it. For this paragraph, imagine that all of your specific aims have been carried out successfully. How do these new results and conclusions change our way of thinking about the field, or provide new mechanistic insights, etc.? How do these results open the way for future investigations? Give the reviewer a bulleted list of clear outcomes they can use in the review.

Results

The results section is critical because it allows you to detail your progress. It also presents the evidence that you will use to answer your research question. First, reorient your reader by identifying the aim associated with the reported result. Restate the rationale and how the data shown will allow you to address part of your aim. For each piece of information, make sure that the method used to collect the data is clearly indicated. You may need to fully describe methods that are novel. Remember that showing data in a figure and/or table and describing the result must also be accompanied by description of your interpretation. How did the data allow you to reach a specific conclusion? Does the way you collected or reported data limit your analysis? Did you make any assumptions in your reasoning that are not clear to a reader? How does this result relate to the progress of the aims? What do these results add to the context for this field? After the first progress review, this section should be divided into "Previous Results" and "Progress since Previous Progress Review" and will constitute the bulk of these following progress reports.

Future Plans

For your first progress review, much of your focus will be on your future work. The following outline matches the organization of this section to that of the A- exam; following this organization will help you compose a document that can be easily revised to meet the requirements of your written A-exam.

Rationale: Remind the reviewer in 1-2 sentences of the rationale for the aim (for example, to determine the molecular and cellular mechanisms underlying classical conditioning of the gill and siphon-withdrawal reflex in the sea slug *Aplysia*).

Method: Describe the experimental steps that you will take to achieve this goal. How much experimental detail to include is always a judgment call, because it depends on knowing what you can reasonably assume that your committee knows. As an example, if you were proposing to analyze DNA prepared from yeast, you don't have to include a protocol for DNA preparation, because you can reasonably assume that anybody likely to review your document knows what a DNA prep is. Therefore, you can just state that you will prepare DNA from exponential growing yeast according to published procedures. However, if you were proposing to perform a GST pull-down experiment, you can't reasonably assume that every reviewer would know exactly what that means and how one performs it; therefore, you would want to include a brief (2-3 sentence) description of the method accompanied by a few references.

Expected outcome and interpretation: Describe explicitly the anticipated result, or possible results, to the experiments. Describe explicitly what you would conclude in the event that you observe any or the potential results that you list above.

Alternative methods: As mentioned above, it is helpful to include a "potential pitfalls" section, in which you describe the most important ways in which your experimental approach could fail. A pitfall could include a protein that won't express in *E. coli*, a double mutant that you wish to analyze that turns out to be inviable, or a protein that proves to be impossible to crystallize. If you include this section, be sure to include one or more steps that you will take to solve the problem. This solution could involve alternative approaches that would enable the pitfall to be bypassed, permitting your experiments to be performed. If you can do this, your committee will think that you are a thoughtful person, who has considered all possible outcomes of the experiments (even the negative ones), and has come up with contingency plans to address them.

Below is an example of how one specific aim might be described in this section. This example is a particularly simple set of experiments to test the hypothesis that a particular yeast protein (called Gal4) is a transcriptional activator of another yeast gene (called *GAL1*).

Specific aim #1: Determine if the yeast Gal4 protein is a transcription initiation activator of *GAL1*.

Two pieces of evidence support the hypothesis that the yeast Gal4 protein is a transcriptional activator of the *GAL1* gene. First, *GAL4* encodes a protein homologous to other known transcription factors (reference), and second, the enzyme encoded by *GAL1* fails to accumulate in *gal4* mutants (reference). I propose several lines of experiments to test this hypothesis.

The inability of Gal1 protein to accumulate in a *gal4* mutant is consistent with the possibility that *GAL4* activates transcription of *GAL1*. However, alternative possibilities exist. For example, Gal4 protein might be required to stabilize Gal1 protein from proteolytic degradation. I will distinguish these possibilities by comparing *GAL1* RNA levels in *gal4* mutants versus wild type using Northern blot hybridization. This Northern blot will also be probed with DNA from the *URA3* gene, which will serve as an internal loading control; *GAL1* RNA levels in each strain will be normalized to the amount of *URA3* detected. I anticipate that *GAL1* levels will be significantly greater in wild type than in the *gal4* mutant. If so, then I will conclude that Gal4 is required for transcription of *GAL1*. However, if *GAL1* transcripts are found in equal amounts between *gal4* mutants and wild type, then I will conclude that Gal4 protein is required for *Gal1* production at a posttranscriptional stage.

Note that if you stop your description at this point, your proposal might very well get a poor score. What could your reviewer object to in your approach or conclusions? Although the reviewer might be convinced that you will be able to determine if *GAL1* RNA is reduced in the *gal4* mutant, the reviewer might not be convinced that this reduction is due to loss of Gal4 protein instead of a second mutation present unnoticed in your *gal4* mutant stock. One way this possibility could be tested and ruled out is to introduce the *GAL4* DNA on a plasmid into the *gal4* mutant and show that this is sufficient to restore *GAL1* RNA levels to wild-type levels. Therefore you would include an additional sentence in the paragraph above:

"To demonstrate that this reduction in *GAL1* RNA results from lack of Gal4 protein, rather than a second mutation present unnoticed in the *gal4* mutant stock, I will reintroduce the *GAL4* DNA on a plasmid into the *GAL4* mutant. I anticipate that this re-introduction will be sufficient to restore *GAL1* RNA levels in the *gal4* mutant to normal. If so, then I will conclude that the lack of Gal4 is responsible for the reduction in *GAL1* transcript levels."

The addition of these two sentences will show the reviewer that you are a thoughtful person who carefully considers every possible interpretation of results, and can propose experiments to distinguish these various interpretations.

Anything else? The question in this aim was originally phrased "Determine if the yeast Gal4 protein is a transcription initiation activator of *GAL1*". Your method to answer this question was a Northern blot. But the question as posed cannot be answered with this method alone because although one can measure differences in transcript amounts between strains with a Northern blot, one cannot determine if alterations in transcript levels result from altered transcription initiation or altered transcript stability. Therefore, your approach doesn't precisely answer the question. You can deal with this problem in either of two ways. First, you can re-phrase your question so that it can be answered by your method of choice. With this solution, you would write "to test the possibility that the yeast GAL4 protein regulates transcript levels," leaving the precise mechanism as an unexplored issue. You would probably state explicitly in the proposal that your approach cannot distinguish between a role for Gal4 in transcription initiation or transcript stability. A better solution would be to figure out and propose an experimental method that can distinguish between these possibilities. You could probably come up with several such methods, and the introduction of these additional experiments would greatly improve the description of your research design and the quality of your science.

Plagiarism: Recognize and Avoid It

What is plagiarism?

Plagiarism is the use of someone else's ideas, processes, results, equipment design, visuals, wording, or even sentence structure as if they were your own, whether the source is printed or electronic.

Every incoming student receives information about plagiarism from the Rice University Honor Council, which judges cases of alleged **Academic Fraud**: "Violating the **Honor Code** requirements of an assignment or failing to credit one's sources constitutes academic fraud and would, therefore, violate the Honor Code." The Council defines plagiarism as "quoting, paraphrasing, or otherwise using another's words or ideas as one's own without properly crediting the source." A "false citation" or "false data" are also violations. Current penalties range from a three-semester suspension and a failing course grade to a warning, depending on circumstances. Check the Honor Council website for further details.

Rice University Policy No. 324, Research Misconduct, states "Research misconduct means fabrication, falsification or plagiarism in proposing, performing, or reviewing research, or in reporting research results. . . . Research misconduct, however, does not include honest error or differences of opinion" (2011).

Professional journals, too, are checking more closely for plagiarism, including self-plagiarism (using your own previously published work with or without citation).

Therefore, **you plagiarize if** you

- Use someone else's ideas, processes, results, equipment design, visuals, or wording without citing the source;
- Copy something word for word without using quotation marks, even if you cite the source;
- Write an unacceptable paraphrase, changing the source wording only minimally, even though you cite the source;
- Use all or part of a visual without crediting the source.

Why is it important to avoid plagiarism?

In the United States, plagiarism is considered **academic misconduct**, and you are expected to recognize and avoid plagiarism. It is YOUR responsibility to use quotation marks when using exact source words, to paraphrase correctly, and to cite all sources whether on slides or in written text. You must cite the source even if no author is identified, as on Wikipedia.

Plagiarized work can result in a failing course grade, expulsion from graduate school, rejection of a paper submitted for publication, denial of an advanced degree, loss of your scholarly reputation, or loss of job.

Most journals run every submitted paper through software that checks for plagiarism. Some journals say explicitly that a paper containing any plagiarism will be rejected; in some cases no paper by that author will be accepted for 3-5 years or longer. Unfortunately, the Internet has made plagiarism easier than ever before, much research is done online, and it is easy to import blocks of text without noting the source. You might also infringe on someone's patent, thereby leaving yourself open for a lawsuit.

How can you avoid plagiarizing?

1. For each source you read, **keep electronic notes**. You might want to use the **Template for Taking Notes**, which can be downloaded from the Rice Center for Engineering Leadership (RCEL): www.rcel.rice.edu, and is available in this handbook. As you enter the information, proofread for

completeness and accuracy. Be careful to put quotation marks around any blocks of text or wording that you import so that later you can put it into your own words and won't accidentally plagiarize.

2. If in your writing you copy something **word for word**, put **quotation marks** around it and cite it: (Jones 2010). **Paraphrase by putting ideas into your own words**; cite the source of the ideas: (Adams et al. 2009). Because you cannot paraphrase a visual, **if you copy a figure or table, cite it** at the end of the caption and inside the period: (Alvarez 2010). **If you change a figure or table or use only part of it, cite it** at the end of the caption: (Adapted from Alvarez 2010). Put the **complete bibliographic reference for all citations** in the Bibliography (or Works Cited).
3. **Practice paraphrasing (putting someone else's ideas into your own words)** because it's often difficult to do. Avoid the temptation of paraphrasing too many details. Focus on the main idea or evidence that you need to cite. (Read carefully—don't change the meaning!) Once you have determined what you need to paraphrase, reread the source and then cover it up. Write the main idea from memory and then check to verify that you haven't used exact wording or sentence structure. Simply changing the verb tense or substituting one adverb for another, but leaving the sentence structure essentially the same, is still considered to be plagiarism. Remember, too, that a paraphrase is always considerably shorter than the original text.
4. **Always cite your source, whether for text, visuals, or ideas**, including those from papers or posters at conferences. If you cannot remember the source, you cannot use the information. Put citations in as you write your first draft so that you don't have to go back later when identifying the source may be difficult. If you use any material from one of your own previously published sources, cite it.

If you are using parts or all of one or more of your published papers in a Master's thesis or PhD dissertation, check the journal contract to see if you already have permission to do so. Otherwise, contact the journal for permission. Keep a paper copy of your request and of their answer. If you are using an entire paper as a chapter, identify it at the beginning of the chapter and then cite it often during the course of the chapter.

Rice now publishes all theses and dissertations as open access works. Since journals want to publish only new material, they probably won't accept work from your Rice-published thesis as a paper. Therefore, if you plan to write a paper based on previously unpublished research reported in your thesis, your advisor can request that your thesis be "embargoed" for 6 – 12 months to give you time to submit a paper. Only then will the university put your thesis into open source electronic access. But your advisor must request that embargo from the Dean of Graduate and Postdoctoral Studies!

5. In your text, **make clear whose work you are referencing**. It often works well to name the author at the beginning of a short paragraph and then give the citation reference at the close of the paragraph. For example: Alvarez disagrees, however, stating that the polymer is not strengthened significantly by Indeed, the evidence given in the paper indicates increased strength of only .005 percent (2010). If the paragraph is long or includes more than one reference, you need to give the reference more than once.
6. Generally, it is a good idea to **identify an author by name rather than by referring to a number in your bibliography**, though this practice varies somewhat by field or by journal. In any case, **try not use a reference number as a part of speech**. Do not, for example, write that "[10] gives more compelling evidence than [98] provides." Think of how time consuming it is for a reader to have to keep flipping to the bibliography to see who has said what. It would be preferable to write "Johnson et al. (10) give more compelling evidence than Dickerson et al. (98) provide." And then move to the evidence, clearly identifying the references as you discuss the evidence each author gives. [Whether you use square brackets or parentheses depends on the field or journal.]

Examples of Citation within the Text

CONFUSING: [10] and [15] were the next to apply this algorithm to new nanoshell applications.

CONFUSING: The first big improvement came in the work of [10].

CLEAR: Koninsky et al. (10) and Rebert et al. (15) were the next to apply this algorithm to new nanoparticle applications.

CLEAR: The first application of this algorithm to gold-coated silica nanoparticles came in 2007 (Smith and Wesson 2008).

LESS CLEAR: Research teams then began to apply this algorithm to gold-coated silica nanoparticles [10, 15]. (But at least the reference is not used as a part of speech.)

CLEAR: Research teams then began to apply this algorithm to new nanoparticle applications. (See, for example, Smith and Wesson 2008 and Rebert et al. 2009.)

CORRECT, but LESS CLEAR: Research teams then began to apply this algorithm to new genetic sequences. (See, e.g., 10, 15, and 22.) [Too many commas—not clear]

CLEAR: (See, e.g., Smith and Wesson 2008 and Rebert et al. 2009.)

For suggestions on how to avoid plagiarism and cite information, see Diana Hacker and Nancy Sommers's *The Bedford Handbook*, 8th ed., 2010 or 9th ed., 2014. The book, available either as a print or an electronic copy, includes extensive examples of APA and Chicago style guides or go to other web sources. Always check a journal's Style Guide for citation specifics for a paper you are submitting. If you are submitting for publication outside the U.S., style expectations will differ. The preferred style may differ from field to field, as well. Ask fellow graduate students if they can recommend software that can automatically reformat to differing styles. If you have kept an accurate and complete electronic file of notes on what you read, you'll be able to meet any requirements.

Using Internet Resources

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Examples of Citation in a Bibliography or Works Cited

Notice that the same basic information is included in the three entries for journal articles, although the styles differ. Choose the style appropriate for what you are writing, and then be consistent within the document. You must follow a style guide.

If the Bibliography is set up numerically rather than alphabetically, references are numbered consecutively within a text, and the bibliography entries would be numbered with the authors' names listed with first name (or initial) first as in [24] J. Conant.

Print sources

Beattie, Christopher, Mark Embree, and D. C. Sorensen. *Convergence of Polynomial Restart Krylov Methods for Eigenvalue Computation*. *SIAM Rev.*, 47 (2005), pp. 492-515. [Journal style]

Chen, J. Y., A. Kutana, C. P. Collier, and K.P. Giapis. Electrowetting in Carbon Nanotubes. *Science* **310**, 1480-1483 (2005). [Journal style]

Hacker, Diana & Sommers, Nancy (2010). *The Bedford Handbook*. Boston: Bedford/St. Martin's. [APA style]

Nicolo, Micah J., Gerald R. Dickens, Christopher J. Hollis, and James C. Zachos. "Multiple early Eocene hyperthermals: Their sedimentary expression on the New Zealand continental margin and in the deep sea," *Geology* 35, no. 8 (2007): 699-702. [Chicago style]

[24] J. Conant. *109 East Palace: Robert Oppenheimer and the Secret City of Los Alamos*. New York: Simon & Schuster, 2005. [IEEE style]

Electronic sources

Travis, E. R.; Hannink, N. K.; van der Gast, C. J.; Thompson, I. P. ; Rosser, S. J.; Bruce, N. C. Impact of transgenic tobacco on trinitrotoluene (TNT) contaminated soil community. *Environ. Sci. Technol.* **2007**, 41 (16), 5854-5861; DOI 10.1021/es070507a. (As illustrated in the Style Guide for *Environmental Science & Technology*; note the substitution of the DOI for the URL and date retrieved when the DOI is available.)

Herbst, Roy S., M.D., PhD., and Scott M. Lippman, M.D. Molecular Signatures of Lung Cancer—Toward Personalized Therapy. *New England Journal of Medicine* 356, no. 1 (January 4, 2007): 76-78. Retrieved April 18, 2007 from <http://www.nejm.org>

Examples of Plagiarizing and Paraphrasing

The original text

“The times people choose for writing are often vestiges of old habits and time constraints. Undergraduates tend to write in the evening or late at night because they have classes and other responsibilities during the day. But habits of nocturnal writing often persist, unexamined, long after the writer’s circumstances have changed, among people who really function best in the morning. The majority of professional writers prefer to work during the day.

Regardless of your preferences, this needs to be a matter of choice, to the extent that you can choose times for writing. After all, you probably schedule other activities at appropriate times, according to your needs. I imagine that you cook or buy meals when you are likely to be hungry, that you sleep when you are tired, and that you run or play tennis when you have some energy, not when you are completely exhausted. Yet a surprising number of people try to write when they are least rested and alert, or most likely to be distracted.”

Hjortshoj, Keith (2001). *Understanding Writing Blocks*. New York: Oxford University Press, 108-9.

(The term “writing blocks” refers to those situations in which a writer is unable to make writing progress; in other words, a graduate student, for various possible reasons, is unable to write and may instead focus time and energy on other tasks, such as reading an almost endless list of background papers or running another iteration.)

Read the following examples and decide if each is paraphrasing or plagiarism. Underline any plagiarism.

1. The times graduate students choose for writing are often based on old habits and time limitations. If as an undergraduate you wrote at night, you need to look at how your circumstances have changed to see if you are one of those people who really function best in the morning. Most professional writers work during the day. But your decision needs to be a matter of choice, to the extent that you are able to choose times for writing. After all, you choose when to eat and when to sleep. Don’t try to write when you are least rested and alert, or likely to be distracted (Hjortshoj 2001).
2. If you are in the habit of doing your dissertation writing late at night, examine your motivation for writing then. You might simply be continuing old undergraduate habits instead of choosing to do your writing during the day when you are not too tired to think clearly.
3. Hjortshoj suggests that students should decide when to schedule their time for writing based on actual conditions rather than on habit. Whereas an undergraduate may need to write at night, a graduate student might be more alert and productive during the day (2001).
4. Keith Hjortshoi (2001) points out that students often choose times to write based on old habits and time constraints of undergraduate days when students tended to write in the evening or late at night. He recommends writing during the day rather than when you are least rested and alert, or more likely to be distracted.

Analysis of the four responses

1. The times graduate students choose for writing are often based on old habits and time limitations. If as an undergraduate you wrote at night, you need to look at how your circumstances have changed to see if you are one of those people who really function best in the morning. Most professional writers work during the day. But your decision needs to be a matter of choice, to the extent that you are able to choose times for writing. After all, you choose when to eat and when to sleep. Don't try to write when you are least rested and alert, or likely to be distracted (Hjortshoj 2001).

The underlined portions are not sufficiently changed. Although some words are changed, “people” to “graduate students” in the first sentence and “majority of professional writers” to “most professional writers,” much of the paraphrase is taken word for word from the source. Even though the source is cited, this is clearly **PLAGIARISM**. Another problem: the attempted paraphrase is too long and summarizes unimportant points such as choosing when you eat or sleep.

2. This may look like a good paraphrase, but because the source is not cited, it is **PLAGIARISM**.
3. This is an acceptable **PARAPHRASE**. It summarizes the major points about choosing writing times based on current circumstances rather than on undergraduate habits. It suggests choosing to write during the day, but with the use of “may” and “might,” it also recognizes that a single approach won't work for all.
4. Keith Hjortshoi (2001) points out that students often choose times to write based on old habits and time constraints of undergraduate days when students tended to write in the evening or late at night. He recommends writing during the day rather than when you are least rested and alert, or more likely to be distracted. **PLAGIARISM**. Even though the source is cited, the underlined portions are all taken word for word. Changing the verb tense of “tend” to the past tense of “tended” is not sufficient change. And notice that the author's name is not spelled correctly.

Frequently asked questions

1. When don't I have to cite the source for information?

You don't have to cite basic knowledge that is found in two or more textbooks. But neither can you use it word for word—you must paraphrase. The exception would be something like a common formula or algorithm; those you would have to use as they appear in the source. Just because 2000 people have read it on Wikipedia, that doesn't make it “basic knowledge.” It's basic if it is found in a number of reputable sources.

2. What if I'm using a common method that's difficult to reword? Do I have to cite the source?

If you use it word for word rather than paraphrasing it, you must cite the source. Many authors simply refer the reader to a paper that contains a clear explanation of the method instead of copying the method. I know of an Assistant Professor who was denied tenure for taking a commonly used method word for word from a published paper.

3. How do I cite a source that I read about in a different article, a review article, for example?

You will have to cite the source as well as the review article. However, as a scholar, you should read the original article instead of relying on what someone else says about it. Reviewers are not equally good, and even a good reviewer may be focusing on different

aspects of the article than you need. The exception would be an article originally published in a language you can't read or an article that is no longer available. In such cases you must make clear that it is the reviewer's interpretation that you are citing.

4. What do I put in the Bibliography or Works Cited?

Everything you cited and nothing that you did not cite.

5. What should I do if I have an important quotation or a really relevant figure, but I can't remember where I found it?

See if you can track it down via the Internet. If you can't find it, you can't use it.

6. Can I cite my own previously published paper in my thesis or cite my thesis in a paper I'm submitting for publication?

Of course, but ask the journal for permission, unless your contract with the journal already gives you permission to use the article in your thesis. You don't need to ask the other authors for permission because every author listed on a published paper has equal copyright ownership, but you should acknowledge their contributions. (Some departments require you to ask permission—be sure to check.) If you were first author and are now using essentially the entire paper as a chapter in your Master's or PhD thesis, make clear at the outset of the chapter that it comes from your paper (cite it clearly!). Then several times in the chapter, cite it again. If you use any figures or tables from the published paper, cite those as well at the end of the caption.

See #4 on page 2 for how to write and publish a paper based on previously unpublished research in your thesis or dissertation. Your advisor can request that your thesis be "embargoed" (meaning that Rice will not put it in open electronic source form for 6 – 12 months) so that you can write and submit a journal paper.

7. Can I cite or publish something of mine that I have already posted on the Internet?

Anything you have posted on any portion of the Internet is already copyrighted and therefore published. You can use that material in your thesis, but most journals will not accept anything that has already been "published" on the Internet. Once your paper has been published, though, you can put a link to it on your personal website.

8. When do I have to get permission to quote or paraphrase someone else's work?

In the academic world, this is sometimes a gray area. You usually don't have to get permission for use if you are writing a paper for a class, a Master's thesis, or a PhD dissertation, though you must cite the source. And because being cited helps faculty receive tenure or academic awards, most researchers are delighted to be cited. Because a journal usually owns the copyright of a published paper; you must ask the journal for permission to cite a written portion or a visual for anything you are submitting for publication (including your thesis or dissertation), including a paper in a *Proceedings*. If your paper comes out of funded research, you may need permission to publish what might be considered the intellectual property of the funding agency.

Modified from an original document by Janice L. Hewitt, PhD

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If electronic source: URL (may be required by your advisor or professional journal); DOI (digital object identifier) if available or name of database or document number; date retrieved. **PUT QUOTATION MARKS AROUND ANY IMPORTED BLOCK OF TEXT** so that you won't later think it is your wording.

Key Words (Be precise, not general):

Specific subject:

Authors' Hypothesis or Claim (What do they say they are presenting that is new?):

Method(s):

Result(s):

Evidence:

Summary of key points: Use quotation marks around any exact wording.

Context and relationships (How does this article relate to YOUR work and to other research? Needed for a lit review):

Important Figures and/or Tables (brief description; page number):

Cited References to follow up on (Cite those obviously related to your topic AND any papers frequently cited by others because those works may well prove to be important as you develop your own work):

Your evaluative comments on the work: For example, does the paper clearly identify its contribution to the field? Is the method used an appropriate one? Do the results match the claim? Is the evidence sufficient and convincing? What flaws do you see in the paper? What strengths? How can this paper be helpful to your own research and/or writing?

Janice L. Hewitt, PhD, Brown School of Engineering, 2014 jhewitt@rice.edu

When should I reference something?

Give a reference if

- its someone else's idea
- its some one else's technique
- its some one else's observation

Disruption of xxx blocks the yyy pathway in Arabidopsis (Smith and Jones, 2003). Because of their similarity to xxx, the abc kinases may be part of the yyy pathway (Doe, 2005). To test this, I will use homologous recombination (Jones and Smith, 2001) to disrupt abc1 and determine if this blocks the yyy pathway.

You could leave the reference off of the second sentence only if this is completely your idea, and was not published by someone else or told to you by someone else. So if Doe mentioned this idea to you but never published it, you would write:

Because of their similarity to xxx, the abc kinases may be part of the yyy pathway (Doe, personal communication).

A good rule of thumb is that each sentence in an introduction needs a reference; sometimes a sentence clearly continues the description of the work in a previously referenced sentence and then doesn't need a reference .

How do I reference material from a review article?

Sometimes you get a review article (Epsilon, 2008) that reads something like

The abc kinases were first discovered by Alpher (Alpher, 1982). There are 15 abc kinases (Beta, 2007). There are two types of abc kinases, type I and type II (Gamow, 2006). The type I but not the type II abc kinases are present in plants but not in animals or fungi (Delter, 2008).

If you paraphrase the above section without reading the four articles, and/or without referencing the review article, you will be in trouble. If you didn't read the 4 original papers, you should only reference the review article:

Two types of abc kinases have been described (see Epsilon, 2008 for review).

If you read the 4 original papers, and in your writing you follow the general outline or format of the review paper (or any other document), you need to reference the review paper or document.

A recent review Epsilon (Epsilon, 2008) describes how Alpher first identified abc kinases (Alpher, 1982), and that are 7 type I and 8 type II abc kinases (Gamow, 2006; Beta, 2007).....