Princeton University

Quantitative and Computational Biology (QCB)

Graduate Student Handbook

2024-2025 Edition

Director of Graduate Studies (DGS): **Ned S. Wingreen**
Graduate Program Manager: **Jennifer A. Giraldi**

QCB Graduate Student Handbook, 2024-2025 Edition

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QCB Program: 5 Year Timeline

Year 1			Year 2		Year 3		Year 4		Year 5	
Fall	Spring		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Take three core courses (QCB 515, QCB 537, the fall seminar course, and COS/QCB 551) & Take Grad Student Primer (MOL 550)	Take one core course (QCB 538, the spring seminar course) & Take two elective courses*		Prep for your General Exam	General Exam (January) & Take one elective course*			Teach**		Dissertation Defense (Defense = "Final Public Oral" or "FPO", occurs end of year 5)	
Lab Rotation #1	Lab Rotation #2	Lab Rotation #3	Work in thesis lab (work should start the summer before year 2 begins)		Continue work in thesis lab and have annual thesis committee meetings in October					

Summers between each year are spent working in your thesis lab; there are no mandatory summer courses, **unless you are scheduled to take our RCR course, QCB 501**, which students usually only take in the summer after their first or second year, whenever it is offered.

*Your elective courses can be taken anytime during your **regular** enrollment (years 1 – 5); this is just a suggested timeline. Courses cannot be taken after regular enrollment ends.

**Students typically teach in year 4, although exceptions can be made with approval from advisor and department.

Ph.D. Program Requirements

Take the following **core courses** in your first year of study: • QCB 515 (fall term): Method and Logic in Quantitative Biology • QCB 537 (fall term) and QCB 538 (spring term): Current Research Topics in the Quantitative Life Sciences • COS/QCB 551 (fall term): Introduction to Genomics and Computational Molecular Biology • Three elective courses from the lists below, including at least one from the *Quantitative* course list and one from the *Biological* course list (substitutions possible with permission from the DGS) Required trainings: • QCB 501 (summer after your first or second year) Topics in Ethics in Science • MOL 550, The Graduate Primer
LSI Graduate Colloquium (fall and spring terms)
Research rotations (completed during your first year, and three are required)
General examination (taken in January of your second year)
Teaching (usually completed in fourth year)
Thesis committee meetings (annually in October after successful general exam)
Dissertation defense (by end of year five)

Regular program length is five years. Please see QCB Program Timeline for program summary.

Course Requirements

Completion of course requirements is necessary to attain the Ph.D. degree. A minimum of a B average across program courses is necessary for successful completion of the program requirement. Courses must be graduate 500 level (exceptions are CHM 403 and QCB 490) and **not** taken as P/D/F in order to satisfy the course requirement, unless DGS approves otherwise ahead of time. **Course substitutions for electives are possible with approval from the DGS; send email to Ned Wingreen and Jennifer Giraldi with any substitution requests *before* you enroll.**

Courses must be taken during regular enrollment (years 1 – 5). You will not be able to enroll in courses at Princeton if your regular enrollment ends and you enter DCE status.

Note: if you take an approved course that is **half-term**, by itself, it will only count for half of one of your required courses. To complete the requirement, you would have to take another approved half course, or something equivalent with the approval of the DGS (i.e. maybe an additional project as part of the course, with the instructor and DGS approval).

Quantitative Elective Course List (*must take at least one*)

- **APC 524 /MAE 506/AST 506** Software Engineering for Scientific Computing
- **CBE 517** Soft Matter Mechanics: Fundamentals & Applications
- **CHM 503/CBE 524/MSE 514** Introduction to Statistical Mechanics
- **CHM 515** Biophysical Chemistry I
- **CHM 516** Biophysical Chemistry II
- **CHM 542** Principles of Macromolecular Structure: Protein Folding, Structure, Design
- **COS 511** Theoretical Machine Learning
- **COS 513** Foundations of Probabilistic Modeling
- **COS 524/COS 424** Fundamentals of Machine Learning
- **COS 557** Artificial Intelligence for Precision Health
- **COS 597D** Advanced Topics in Computer Science: Advanced Computational Genomics
- **COS 597F** Advanced Topics in Computer Sci: Computational Biology of Single Cells
- **COS 597G** Advanced Topics in Computer Sci: Understanding Large Language Models
- **COS 597O** Advanced Topics in Computer Science: Deep Generative Models: Methods, Applications & Societal Considerations
- **ELE 535** Machine Learning and Pattern Recognition
- **MAE 550/MSE 560** Lessons from Biology to Engineer Tiny Devices
- **MAE 567/CBE 568** Crowd Control: Understanding and Manipulating Collective Behaviors and Swarm Dynamics
- **MAT 586/APC 511/MOL 511/QCB 513** Comp Methods in Cryo-Electron Microscopy
- **MOL 518** Quantitative Methods in Cell and Molecular Biology
- **MSE 504/CHM 560/PHY 512/CBE 520** Monte Carlo and Molecular Dynamics Simulation in Statistical Physics & Materials Science
- **NEU 437/537** Computational Neuroscience
- **NEU 501** Cellular and Circuits Neuroscience
- **NEU 560** Statistical Modeling and Analysis of Neural Data
- **ORF 524** Statistical Theory and Methods
- **PHY 561/56 2** Biophysics
- **QCB 505/PHY 555** Topics in Biophysics and Quantitative Biology
- **QCB 508** Foundations of Statistical Genomics

Biological Elective Course List (*must take at least one)*

- **CHM 403** Advanced Organic Chemistry
- **CHM/QCB 541** Chemical Biology II
- **EEB 504** Fundamental Concepts in Ecology, Evolution, and Behavior II
- **EEB 522** Colloquium on the Biology of Populations
- **MAE 566** Biomechanics and Biomaterials: From Cells to Organisms

- **MAE 567/CBE 568** Crowd Control: Understanding and Manipulating Collective Behaviors and Swarm Dynamics
- **MOL 504** Cellular Biochemistry
- **MOL 506** Cell Biology and Development
- **MOL 518** Quantitative Methods in Cell and Molecular Biology
- **MOL 521** Systems Microbiology and Immunology
- **MOL 523** Molecular Basis of Cancer
- **MOL 559** Viruses: Strategy & Tactics
- **QCB 490** Molecular Mechanisms of Longevity
- **QCB 535** Biological networks across scales: Open problems and research methods of systems biology
- **QCB 570** Biochemistry of Physiology and Disease

Selected undergraduate courses of interest

(*Note: these do not count toward course requirements*)

- **APC 350** Introduction in Differential Equations
- **CBE 448** Introduction to Nonlinear Dynamics
- **COS 226** Algorithms and Data Structures
- **EEB 324** Theoretical Ecology
- **MOL/QCB 485** Mathematical Models in Biology
- **ORF/MAT 309/380** Probability and Stochastic Systems
- **ORF 406** Statistical Design of Experiments
- **QCB 302** Research Topics in QCB
- **QCB 311** Genomics

Please visit the registrar's course offerings page see what is be offered this academic year and for detailed course information.

Responsible Conduct of Research (RCR)

Students are required to take QCB 501 Topics in Ethics in Science**,** the QCB course in responsible conduct of research (RCR). This course is offered every other year during the summer and students will be notified when an enrollment year is approaching. Students are also permitted to enroll in an RCR course hosted by an affiliated department, provided both home and host departments give approval. The QCB Executive Committee is also available to field and answer questions about issues in the arena of "Responsible Conduct of Research."

Students will also complete a mandatory online RCR module during their first term of enrollment. Instructions are sent directly to new students from the graduate school.

Students must complete all RCR training by their **third year of study, preferably earlier** (this is a requirement set by the Graduate School).

LSI Graduate Colloquium

QCB students are required to attend the **LSI Graduate Colloquium** during the fall and spring terms, usually held on Thursday afternoons. Second year students will give research talks in the fall term and fourth year students will present their work in the spring term. The series will end with first-year students giving short presentations on the work they have done in one of their rotations. Schedule will be made during the summer by our student colloquium committee.

Research Rotations & Choosing a Thesis Advisor

QCB students are required to complete three research rotations. Rotations will take place during the fall, winter, and spring of the first year. The first rotation is approximately 13 weeks in length and the second two rotations are about 10 weeks in length each. The first rotation is longer than the remaining two rotations due to a heavier course load in the fall. Students can choose rotations at their discretion. **All lab rotations must be discussed with and approved by the Director of Graduate Studies in advance.**

Research rotation expectations: Students are required to meet with the faculty member they are rotating with at the beginning of the rotation to form a working plan. Students are expected to show up routinely in lab to work on their project and to attend all lab meetings, and it is recommended that the student meet with the faculty member periodically. Satisfactory rotation performance is one condition of reenrollment. Students will be expected to present the work done during their lab rotations to their QCB peers during the

spring term of the LSI Graduate Colloquium. At the end of each rotation, the department will obtain feedback from both students and faculty.

Students should have a thesis advisor by the end of their third rotation. If a student foresees a delay, they should meet with the DGS as soon as possible to discuss a course of action.

Rotation schedule for 2024-2025 academic year*

ROTATION	BEGINS	ENDS
FIRST	**September 9, 2024**	**December 6, 2024**
SECOND	**December 9, 2025**	**February 21, 2025**
THIRD	**February 24, 2025**	**May 2, 2025**

- The first rotation is a bit longer than the second and third rotations due to the heavier courseload in the fall term.
- **If you anticipate that you will not have a thesis advisor by May 9, 2025, please reach out to DGS as soon as possible.**

*We understand your rotation dates might not follow this schedule exactly for a variety of reasons, and that is okay. There is enough leeway to still ensure you can do three 10-week rotations. We have tried to account for the University holiday weeks when estimating rotation start and end dates. ***Work in thesis lab should begin no later than mid-May***.

QCB General Exam Requirements (taken in January of your second year of study)

The general exam consists of an 8-10 page written thesis proposal, in the format and style of an NIH predoctoral NRSA application, and a two-hour oral exam.

The overall goal of the general exam is to be sure that you have developed a novel and feasible research plan of appropriate scope for a thesis project, and that you have the knowledge and the skills required to carry it out. Students are highly encouraged to develop successfully defended thesis proposals into F31 applications, if eligible.

1. **Forming your committee: the department will work with the student's advisor in forming an appropriate exam committee.** Once a committee is formed, the student will be responsible for coordinating a date and time and reserving a room for the exam. The general exam committee will consist of three faculty, and the student's advisor(s) will not serve on the examining committee and is not present at the exam. At least 1 of the 3 committee members must be QCB faculty.

2. **When it happens:** General Exams are held in January of your second year; any exceptions must first be approved by the Director of Graduate Studies and then by the Graduate School, if it falls outside of their pre-determined exam windows (see the registrar's academic calendar).

3. **How to prepare**: The **written portion** of the general exam is a report describing the thesis proposal and is written by the student in consultation with their thesis advisor. It is recommended that the thesis advisor(s) review the student's thesis proposal and offer feedback to the student before the general exam, but advisors are asked not to rewrite any part of the proposal.

   Proposals should be in the style of an NIH F31 predoctoral fellowship, as follows:

Title page	1 page
Project summary	Maximum 30 lines (single-spaced)
Specific Aims	1 page (single-spaced)
Background and Significance	~ 2-3 pages (double-spaced)
Innovation	~1/3-1/2 pages (double-spaced)
Preliminary Results	1 - 2 pages (double-spaced)
Approach	4 - 5 pages (double-spaced)
References	Not counted in the page total

Tables and Figures	Kept to a minimum, i.e., include only necessary figures and captions to support your background, preliminary results, or approach. Place at end of document.

Formatting:

- Font size must be 11 or 12.
- Recommended fonts include: Arial, Helvetica, Georgia, Palatino Linotype
- Provide at least ½ inch margins on all sides.
- Project Summary and Specific Aims are single-spaced.
- Background and Significance, Innovation, Preliminary Results, and Approach should be double-spaced and not exceed 10 pages.
- References, tables, and figures are not included in the 10-page limit and do not have to be formatted as double spaced.
- Figure legends are not included in the 10-page limit and font can be less than 11 but must be legible when document is viewed at 100%. Figure legends should help the reader understand the data presented in the figure but are not to be used to present information not present in the body of the document.

Further guidelines for formatting and content:

TITLE PAGE

Title

Name

Advisor(s)

Project summary *(no more than 30 lines single-spaced)*

Specific Aims *(1 page single-spaced)*

- *The Specific Aims page should summarize all the major elements of the project/proposal – the significance, the overarching question and/or hypothesis, the aims, and the overall approach - in a single page. State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will have on the research field(s) involved.*
- *List succinctly the specific objectives of the research proposed (e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing*

paradigm or clinical practice, address a critical barrier to progress in the field, or develop a new technology).

- *Provide a brief introduction to the project.*
- *If your project is hypothesis driven, state your underlying hypothesis or hypotheses.*
- *State your specific aims.*
- *Describe how the field will be advanced by your project.*
- *Specific Aims pages traditionally do not contain references.*

A. BACKGROUND & SIGNIFICANCE *(~2-3 pages double-spaced)*

- *Background of the field and description of how your proposal fits into what is known and unknown.*
- *Significance of your proposed research for the advancement of your field of study and, if relevant, to human health or general well-being.*
- *Use subheadings to state clearly the key message of the following paragraph.*

B. INNOVATION *(~1/3 – 1/2 page double-spaced)*

- *State how your research is conceptually and/or technically innovative.*

C. PRELIMINARY RESULTS: can be provided as a separate section here or/and embedded in each aim as shown below. Think about how to best describe the foundation for the project and/or demonstrate its feasibility. Be sure to acknowledge who generated the results if these were not generated by you. It is allowable to include results generated by somebody else in the lab and still unpublished if these results strengthen the points you are trying to make and are properly cited/acknowledged.

D. APPROACH *(remaining space, i.e., ~4-5 pages double-spaced; this section would be section "C" if the preliminary results are not included as a separate section above)*

SPECIFIC AIM 1: *Restate the specific aim*
***Rationale*:** *Provide the rationale for the question(s) asked, the hypothesis, and the approach used to address the specific aim.*

Preliminary Results: *Can be either embedded in each aim or provided as a separate section prior to the Approach section (as shown above).*

Overview of Experimental/Conceptual Design: *This short section can also be placed after the Rationale.*

Aim 1.1: *State specific subaim*
Experimental Approach:

- *Address data analysis and rigor of the approach*

Repeat these sections for each subaim 1.2, 1.3,…

Anticipated results/Potential pitfalls/Alternative approaches: *here you should acknowledge what you expect if all goes to plan. What logical or obvious issues might prevent all from going to plan, and what you will do to get around these issues if they arise.*

Repeat this format for additional Specific Aims.

References

- *Cite liberally! All main statements should be backed up by appropriate references.*
- *There are no limits to the number of references.*
- *You can use any citation style within the body of the document that you like (numbered, author-date).*
- *For your reference pages use a style that includes the names of the authors, title of the manuscript, journal name, year, volume(issue), page numbers, preferably PMID number.*
- *Minimize citation of review articles and focus on primary research articles.*

4. **Submit your final thesis proposal** to your committee members and the program manager at least one week in advance of your general exam.

5. **The second part of the generals is a two-hour oral presentation**, which should cover the content in the written proposal.

    a. **The format: Chalk talk. If you'd like to add anything, such as a video, you must *consult with your exam committee for approval beforehand.*** During the presentation, anticipate being interrupted early and often with comments and questions throughout your presentation. They will ask questions to get a sense of your breadth and depth of knowledge in your area of focus, as well as general molecular, biological and theoretical/quantitative knowledge. It is normal and acceptable for you to not know the answers to all of their questions, so do not panic if you have to say "I don't know". It is a good idea to make sure your room is equipped with supplies you need before you begin (chalk, water, etc).

    b. **Have a minimum of two practice exams with your group**, one of which should include your thesis advisor(s). It is often helpful to ask more senior students from

the groups of your committee members to come to your practice exams and try to ask the kinds of questions their advisors might.

The general exam results: your generals committee will confer immediately after your exam and submit a written recommendation to the program graduate committee, who will then decide the final result. You will receive an official document from the department and the graduate school, stating the pass or fail, generally once all students in your cohort have taken the exam. If the result is a fail, you must retake the exam within a year of the fail date. Students who fail a second time will have their Ph.D. candidacy and enrollment terminated, per graduate school policy.

Students who pass the general exam will receive an email from the graduate school inviting them to apply for their incidental Master of Arts degree, which is done through TigerHub.

In summary, your proposal should present a research project that you intend to carry out over the duration of your time in the QCB program. The proposal should include a cited background in literature, how your project fits into this background, the significance of your proposal, the approach you will use and what the rationale is behind your approach. You should also discuss potential problems and what alternative strategies may be used to lead to possible solutions. And please keep in mind that this is a proposal, and it is understood that it is in the preliminary stages of research.

Teaching

To complete the QCB teaching requirement, a student typically teaches the equivalent of a semester of teaching, usually in their fourth year of study. For example, a student could teach one full-time term or two part-time terms to complete the minimum program requirement. Students are not permitted to teach until after a successful general exam.

Please note that this is the minimum to complete the program's teaching requirement. You may need to teach additional appointments at your advisor's request, for funding and/or educational purposes. If you do not teach full-time, and are not on fellowship, your advisor will be expected to fund the remaining stipend and tuition that term(s).

Every spring, the department will send out a *Teaching Request* form, and this would be a good time for you to have a discussion with your advisor about expectations for the upcoming academic year. If you will be teaching in the upcoming year, you will indicate which courses would be a good fit for you. Students G4+ who need to complete the program requirement are considered first for available teaching slots.

First-time Assistants-in-Instruction (AI's) are required by the Graduate School to attend a training & orientation course given by the McGraw Center for Teaching and Learning. Training is offered twice a year, once in early September for fall term AI's and once in late January for spring term AI's. The department must register all students, so they are given credit for completing the training.

If you are on a fellowship, you can usually still teach, but it must be a 3-hour (50%) assignment or less. This is graduate school policy. You also need to check with your fellowship officer on if they have any specific rules regarding teaching to make sure it is allowable (every fellowship is different!)

Reenrollment and your IDP (annually in April)

Students are evaluated on an on-going basis by their research advisor, thesis committee and the Director of Graduate Studies. Readmission to a subsequent academic year is conditional on the progress and conduct during the previous year.

Students will be notified by the Graduate School via email, with instructions, when it is time to submit the reenrollment application. This is an annual process. Reenrollment applications typically open to students in mid-March, with a deadline in April. On the reenrollment application, students describe their academic progress of the current year and their goals for summer and the next academic year. **Students are expected to be as detailed as possible in the applications**, or their reenrollment application may get an initial rejection by their advisor, which causes a delay in process. (e.g. do not only write "work in lab" as your summer goals).

Once the student submits the application, the advisor then provides feedback. First year student applications are routed to the DGS. In turn, the department receives the application, provides feedback, and submits the application to the Graduate School for approval. The student will then receive a renewal contract from the Graduate School for the upcoming academic year.

IDP, or your Individual Development Plan: completing your IDP is a mandatory part of reenrollment, and you must upload your IDP to your reenrollment application or your application will not be processed.

Thesis Advisory Committee and Thesis Committee Meetings

After the student has chosen a thesis advisor and passed the general exam, they must form a thesis committee, which consists of the thesis advisor and two additional faculty members. If you are co-advised by two faculty, you will need two non-advisor committee members; if you are co-advised by three faculty, one additional committee member is sufficient. At least one member of your committee must be QCB faculty. If you need assistance in forming your committee, please work with your advisor and/or DGS. The thesis committee must ultimately be approved by the DGS.

Thesis committee meetings are mandatory and held annually in October. The student or any of the committee members may hold additional meetings as needed. It is recommended that at least two meetings are held each year, but only one is required. This is not only a requirement of the program, but also of the graduate school.

To prepare for the thesis committee meeting, the student should write 1-2 pages about their research progress and goals and then present this and any future plans to the thesis

committee for feedback. Meetings typically last one hour. Graduate students are responsible for organizing the meeting.

Please keep the department informed of any upcoming meetings, so the department can note you have completed this requirement for the year.

Dissertation

After the student has chosen a thesis advisor, completed all coursework, and passed the general exam, the remainder of the program is devoted to independent research leading to the writing of a dissertation.

The dissertation must show that the candidate has technical mastery of the field and is capable of doing independent research. This study must enlarge or modify current knowledge in a field or present a significant new interpretation of the known materials.

The dissertation is reviewed and approved by at least two principal readers before being submitted for acceptance to the Graduate School. **The Graduate School requires that all reader's reports and other documentation be received in their office, via the advanced degree application in TigerHub, at least three to four weeks before your defense (FPO) examination date.**

Thesis format and procedures for its deposition with the University archives can be found on the Mudd Library website.

Final Public Oral Examination (your dissertation defense)

The final public oral (FPO) examination is a final exam in the student's field of study and a defense of the dissertation, and is the last formal requirement for the Ph.D. The student's thesis advisory committee usually serves as the examining committee and conducts the FPO. Additional faculty may need to be included as at least two of your FPO committee members may not also be principal readers of your dissertation.

The FPO consists of a public lecture on the thesis research, usually of about one hour in length. During this presentation, the public and the examining committee may question the student about the research.

Students who successfully defend by early May are invited to participate in Commencement. Degree deadline dates can be found on the graduate school website.

If the student does not pass the final public oral examination, they may request to retake the examination within one year. If unsuccessful a second time, the candidate is not

permitted another opportunity to retake the examination, per graduate school policy, and Ph.D. candidacy is terminated.

Students may wish to consult benefits and status after the FPO for information about benefits you may receive between FPO and degree conferral.

Timeline to your Dissertation Defense (FPO, Final Public Oral)

To start: Click here for degree deadlines

Please refer to the graduate school website for their "Preparing for the FPO" timeline as any updates will be posted there.

QCB specific information for your **principal readers** and **examining committee:**

a. *Dissertation readers*: You must have two faculty dissertation readers. One should be your advisor.
b. *FPO exam committee*: A minimum of 3 faculty members are required, and one is your advisor(s). Two faculty on your committee must **not** be principal readers of your dissertation. At least one member of your committee must be QCB faculty.
c. Coordinate your FPO date and time with your exam committee and book a room.

Student enrollment statuses

Please visit the Graduate School website for information regarding the following student statuses: In Absentia, Leave of Absence, Withdrawal, Degree Completion Enrollment (DCE), Enrollment Terminated, Degree Candidacy Continued (ETDCC) and Termination.

Funding Information

Students in QCB are provided funding for a five-year enrollment period. For the first year of study, the Graduate School provides fellowship and tuition payment; in subsequent years, students are funded via department funds, training grants, teaching positions, research grants, internal or external fellowships, or a combination thereof.

Graduate students are paid once a month. Direct deposit can be set up through TigerHub. Direct deposit instructions

Paycheck amounts will vary year-to-year depending on the funding source. If a student is paid via **fellowship**, no taxes are directly deducted from paychecks, and students are expected to report those taxes. Your first-year fellowship from the graduate school is considered a fellowship. Other potential fellowships include the LSI's NIH training grant, and external awards such as the NSF, NJCCR, etc. If a student is **not on a fellowship (i.e. research or teaching),** then taxes are taken out of paychecks like any other salaried position. The graduate school does not offer tax assistance, but a guideline summary can be found on their website. Tax information

QCB Training Grant

You will be notified by our Senior Grants Manager in early summer if you are selected to be funded by our QCB training grant for the upcoming academic year and summer. This is a 12-month appointment. Typically, this would happen in years 2 and 3 of your graduate education. Only citizens and permanent residents, who fit the research mission of the grant, are eligible.

NOTE: *You cannot accept an external opportunity/summer internship if the dates coincide with training grant funding.*

External Fellowships and Awards

Students are encouraged to apply for outside sources of funding. Please discuss with your advisor about appropriate fellowship opportunities and visit Princeton's fellowship site.

Students who do obtain external awards must fill out the Graduate School's External Fellowship Form, so the graduate school and the department have all of the necessary award information and we can adjust your payroll accordingly.

External Opportunities, i.e. summer internships

Before you accept an internship opportunity, **you must obtain permission from your advisor, first and foremost**, and then the program DGS. Once you have permission, you fill out the external opportunity form through TigerHub and submit your request to the graduate school. Once they approve your request, you can move forward with your internship.

You must also notify the department program manager as soon as possible with your approved internship start and end dates, for system updates.

NOTE: you cannot accept an internship opportunity if any of the dates coincide with QCB training grant funding.

Safety Training

All students must complete **laboratory safety** and **biosafety training** offered by Princeton's office of Environmental and Health Services (EHS). Students who do not take this training course will not be permitted to work in a lab. Students will typically complete training during September orientation, before the start of their first lab rotation.

Students should visit the EHS website, for further information on safety issues, hazardous material and more.

Student Vacation Policy

Graduate study is understood to be a full-time commitment. The specific periods taken as vacation must not conflict with the student's academic responsibilities, coursework, research or teaching.

Students must discuss vacation time with their advisor. If a student is teaching, approval must also be given by the course instructor. AI's will typically not be allowed to take vacation when class is in session or during reading period and exam times.

Graduate study is understood to be a full-time commitment on the part of students. During an academic year, which includes the summer, graduate student degree candidates may take up to (but no more than) four weeks of vacation, including any days taken during regular University holidays and scheduled recesses (e.g., the fall- and spring- term breaks and inter-term break). The specific periods taken as vacation must not conflict with the student's academic responsibilities, coursework, research, or teaching, and should be discussed in advance with one's director of graduate studies, adviser, or dissertation committee.

Travel

The Graduate School requires that all graduate students on *University sponsored travel* register their trips in their **Enroll My Trip** system. This is travel that is funded, entirely or in part, by PU funds or funds processed through University accounts.

Students **must also complete** the graduate school's work abroad survey for permission to travel internationally *whether or not it is University sponsored or personal travel to an OFAC-sanctioned country*, to ensure that stipend will still be received.

For complete travel information, rules, and requirements, and links to support, please email Jennifer Giraldi at jgiraldi@princeton.edu.

Graduate Student Committees

The QCB and Biophysics graduate programs have several committees that program students can participate in, including:

- **Graduate Student Organization** (GSO): The GSO is organized and run by the students; every grad student year has a representative on the committee and this group serves as a liaison between faculty/administration and the student body.
- **Graduate Colloquium Committee**: This group organizes the overall colloquium schedule and handles the weekly announcements and food ordering.
- **Peer Mentor Committee**: Senior grad students pair up with first-year students to serve as their mentors. The committee hosts an orientation mixer during orientation week to help with pairing mentees and mentors.
- **Social Event Committee**: The committee is allotted $500 per academic term to organize community building events for the program graduate students.
- **Women in QCB/Biophysics**: Women in QCB/BPY is a graduate student group that aims to support female researchers and graduate students at LSI. They hold monthly social events and lunches to build community, connect, discuss, and have fun. They also aim to invite a prominent female scientist in the Princeton community once a semester to join them in discussion and networking. All are welcome to join.

Affiliated Seminar Series

Please note that attendance is mandatory for the QCB seminar series only. All other seminars are optional and listed here for informational purposes only. Seminars are held during the academic year.

QCB Seminar Series (Lewis-Sigler Institute) – attendance is mandatory

Chemical and Biological Engineering

Chemistry

Computer Science

Ecology & Evolutionary Biology Seminar Series

Molecular Biology Seminar Series

Neuroscience Seminar Series

PACM Seminar Series (Program in Applied and Computational Mathematics)

Physics

Informational Links and Contacts

QCB Graduate Program

QCB Faculty

QCB Staff

TigerHub Login Page
(site used by students to register for courses, reenroll and manage payroll information, including setting up direct deposit and W-2 information)

CPS (Counseling and Psychological Services)
Location: McCosh Health Center (Third Floor); Phone: 609-258-3285

University Health Services
Location: McCosh Health Center; Phone: 609-258-3129

Payroll questions
Location: 701 Carnegie Center, Suite 154
Phone: 609-258-3082; Email: payroll@princeton.edu

Tax questions
For additional help, domestic students must visit the IRS website or consult a professional tax preparer for assistance; international students can visit the Davis International Center for assistance.

Housing Office

Weather Hotline: 609-258-SNOW

Public Safety: 609-258-1000

Core Course Descriptions

QCB 515 Method and Logic in Quantitative Biology [Fall term]
Close reading of published papers illustrating the principles, achievements, and difficulties that lie at the interface of theory and experiment in biology. Two important papers, read in advance by all students, will be considered each week; the emphasis will be on discussion with students as opposed to formal lectures. Topics include: cooperativity, robust adaptation, kinetic proofreading, sequence analysis, clustering, phylogenetics, analysis of fluctuations, and maximum likelihood methods. A general tutorial on Matlab and specific tutorials for the four homework assignments will be available.

COS/QCB 551 Introduction to Genomics and Computational Molecular Biology [Fall term]
This interdisciplinary course provides a broad overview of computational and experimental approaches to decipher genomes and characterize molecular systems. We focus on methods for analyzing "omics" data, such as genome and protein sequences, gene expression, proteomics and molecular interaction networks. We cover algorithms used in computational biology, key statistical concepts (e.g., basic probability distributions, significance testing, multiple hypothesis correction, data evaluation), and machine learning methods which have been applied to biological problems (e.g., hidden Markov models, clustering, classification techniques).

QCB 537/538 Current Research Topics in the Quantitative Life Sciences [Fall and spring terms]
Mandatory first-year graduate course centered around the weekly QCB seminar series, intended to help develop competency in critical reading and assessment of academic literature across subfields early in graduate training. Class meetings comprise student-driven presentations and discussions surveying research topics relevant to upcoming talks, with an emphasis on latest methodologies and debates. Assessment includes seminar and class attendance, in-class and in-seminar participation, and peer evaluation.

QCB 501 Topics in Ethics in Science [Offered every other summer, next offering is summer 2025]
Discussion and evaluation of the role professional researchers play in dealing with the communication of research, responsible authorship, human and animal studies, misconduct and fraud in science, intellectual property, and professional conduct in scientific relationships. Participants are expected to read the materials and cases prior to each meeting. Successful completion is based on regular attendance and active participation in discussion. This half-term course is designed to satisfy federal funding agencies' requirements for training in the ethical practice of scientists. Required for graduate students.

MOL 550, The Graduate Primer [Fall term]
Course focuses on the knowledge and skills necessary to be successful in a graduate program in biological science. This course helps students develop technical, leadership, and professional and executive skills. Topics include time management, effective communication, data management, managing reading load, oral research presentation, and critical reading of scientific literature.

QCB Graduate Student Checklist

If needed, this checklist is intended to help you keep track of your graduate career milestones.

Course Requirements

- ☐ **QCB 515** Method and Logic in Quantitative Biology
- ☐ **COS/QCB 551** Introduction to Genomics and Computational Molecular Biology
- ☐ **QCB 537/538** Current Research Topics in the Quantitative Life Sciences
- ☐ **QCB 501** (our RCR or Responsible Conduct of Research training course)
- ☐ **MOL 550** (Graduate Student Primer training course)
- ☐ **Elective #1** _____
- ☐ **Elective #2** _____
- ☐ **Elective #3** _____
- ☐ NOTE: At least one elective must be from our *Quantitative* course elective list and one from our Biological course elective list. All course substitutions must be approved by the DGS, email Ned Wingreen and Jennifer Giraldi before a course is taken. Courses cannot be taken P/D/F.

Research Rotations

Students must complete three lab rotations. All rotations are usually completed by end of the first year, and the student's thesis lab should be decided upon at the conclusion of the rotations and started the summer after their first year. If a student foresees any issues with this timetable, they should meet with the DGS to discuss a course of action.

- ☐ Rotation 1: Lab and Project

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- ☐ Rotation 2: Lab and Project

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- ☐ Rotation 3: Lab and Project

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General Exam (held in January of your second year):

- ☐ By the fall of your second year, the department will work with advisors on creating exam committees, which will consist of three faculty. The exam committee cannot include your thesis advisor. Committees must have at least one QCB faculty member.
- ☐ Once you are notified of your exam committee, book the date/time/room with your committee as soon as possible.
- ☐ Prepare your written submission and practice giving your talk.
- ☐ Submit proposal to your committee and Jen Giraldi at least a week in advance of the exam.

  Exam committee member #1 _____
  Exam committee member #2 _____
  Exam committee member #3 _____

Thesis Committee Meetings (held annually in October)*

- ☐ Form thesis committee by the fall term following your successful general exam (one member will be your advisor(s)). At least one member must be QCB faculty. All committees must be approved by DGS.
- ☐ Completed meeting in October of third year.
- ☐ Completed meeting in October of fourth year.
- ☐ Completed meeting in October of fifth year.

  Thesis committee member #1 _____
  Thesis committee member #2 _____
  Thesis committee member #3 _____

*To prepare for a meeting, write up 1-2 page summary of your research progress and goals. Present this and your future plans to the thesis committee for feedback.

Dissertation and FPO (Final Public Oral): You can find information and a complete checklist for Princeton's FPO process here: