



Final Examination/Thesis Requirements for the Master's Degree in Biology

Department of Biology, Queens College, CUNY

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Depending on personal interests and career goals, candidates for the MA degree in Biology may choose one of two tracks to fulfill degree requirements—the research-intensive track (30 credits required) and the course-intensive track (32 credits required). The purpose of this document is to lay out the final examination requirements associated with the two tracks.

For information regarding other requirements for the Master's degree, such as credits, GPA, transfers, and minimum and maximum course allowances, please see the Master's degree page of the QC Biology Dept. website (<http://biology.qc.cuny.edu/degrees/masters/>). That website also has links to college-wide graduate program information in the QC Graduate Handbook and Bulletin. For any questions about the contents of this document or about the Master's program, please contact the Graduate Advisor, Dr. David Lahti (david.lahti@qc.cuny.edu). For individualized mentorship and advice in the program, especially for students who do not yet have a faculty mentor, please contact the program's Student Success Advisor, Dr. Travis David (travis.david@qc.cuny.edu).

Preliminary points:

- Any student may perform research (and receive credits for research), at the discretion of the faculty mentor, regardless of track. The two tracks relate only to the requirements and assessment of the final examination.
- BIOL799 is credit for performing research. It is not a class, but a route by which research students at the graduate level can receive course credit for the research they perform. Students can apply a maximum of 12 credits of 790s courses towards the degree. Of these, 9 can be BIOL799 credit for research-track students, and 6 can be BIOL799 for coursework-track students. Only students who are performing some sort of research (whether empirical, theoretical, or literary) under a faculty mentor can receive 799 credit. The registration form for graduate research credit is on the QC Bio Dept website. Students are encouraged to take advantage of research credits.
- The relationship between faculty mentor and student is voluntary throughout the program; students must request faculty mentorship, and faculty members may refuse. Students may switch faculty mentors, and faculty members may ask students to leave their laboratories and mentorship.
- The student's track is informal until the final examination period (when a student writes a thesis or literature review and defends it). For instance, if the student initially takes on a mentor for the research-intensive track and experiments do not go well, or are not extensive enough for a research thesis, the student may opt, with the permission of the existing faculty mentor or a new one, to write a literature review instead, according to the requirements of the course-intensive track.
- The Master's program does not have a determinate time length; the program ends for each student with a successful final examination and graduation approval, whenever that occurs.

Students please note: The Final Examination Requirements for both the course-intensive and research-intensive tracks are substantial and require extensive preparation and guidance. They should not be performed without the express consent and supervision of a full-time faculty member of the QC Biology Department who has agreed to serve as mentor. Each Master's student in the QC Biology Department is strongly encouraged to seek a mentor as soon as possible following initial matriculation into the program.

Final Examination Requirements of the RESEARCH-INTENSIVE TRACK: The Master's Thesis

Students in the Master's Program who intend to perform research and complete a thesis must have a faculty mentor who is willing:

- to provide the laboratory space, equipment, and other resources for the completion of the research project,
- to serve as supervisor, and to provide guidance for all laboratory or field work
- to serve as advisor for the writing and defense of the thesis, and
- to serve as chairperson for the thesis committee.

Any full-time faculty member of the QC Biology Department (either Lecturer or Professor) who is engaged in original research can be a mentor for a Master's student in the research-intensive track. Rarely, with the approval of the Graduate Advisor, a faculty member performing biological research in another QC department can be the faculty mentor (although this person will not chair the thesis committee, see below). QC Bio Master's students may not have faculty mentors for their thesis research outside of QC. Once a faculty member agrees to be the student's mentor, the two will decide together on a research project and the nature and extent of the student contribution. When seeking a mentor, students should be aware that usually the research project will be within the range of the goals, methods, and study organisms of the faculty mentor's existing research program. The Master's research project should be original (whether theoretical, observational, or experimental, but *not* a literature review or perspective piece). The student contribution to the project should be of a nature and extent that would justify authorship of a professional scientific journal article based on that research. The student need not contribute all of the intellectual and empirical work to the project; collaborations with other researchers at QC or elsewhere in addition to the mentor are common and acceptable.

At some point during the student's research, a thesis committee should be assembled by the student with the guidance of the faculty mentor. The thesis committee consists of at least three qualifying members, including a chairperson who must be a full-time faculty member in the QC Biology Department. In most circumstances, the chair is the faculty mentor. The exception is the rare case where the faculty mentor is in another QC department; in this situation, another member of the thesis committee, who is a full-time faculty member in the QC Biology Department, will be the chair. A visiting or part-time research-active faculty member, a postdoctoral researcher, or a doctoral student may practically supervise the research of a Master's student; but for official purposes including all aspects of the final examination, the chair must be a full-time faculty member in the QC Bio Dept. The remaining qualifying members of the thesis committee must be full-time faculty members at Queens College, whether in the Biology Department or another department. Additional qualifying members may be added to the committee. Honorary members may likewise be added at the discretion of the faculty mentor, whether they are qualifying or not. Honorary members can attend and contribute to the defense and advise the chair; these often include immediate research supervisors or external collaborators who not qualify to be official members of the thesis committee.

The thesis committee can be assembled at any time following the commencement of research with a faculty mentor. Some students wait until the thesis is nearly complete to discuss the committee with their mentors and email requests for membership to other faculty. However, students can form valuable relationships with other thesis committee members, who can provide helpful advice on research, the upcoming thesis, and other aspects of the student's career. Thus, each student is encouraged to discuss forming the committee with the research mentor and invite prospective members early.

The Master's thesis is a document consisting of at least one chapter, which describes the results of original biological research, that could be published as a peer-reviewed scientific journal, to which the student contributed substantially and intellectually. There is no minimum page requirement. Additional relevant chapters, an introduction, appendices, and other materials may be added to the thesis with the permission of the faculty mentor. Most theses are organized in typical scientific paper format, with a fully referenced *Introduction* that places the study in a broader scientific context and lays out the question or hypothesis to be addressed; a *Methods* section that describes the procedures used in the study; a *Results* section that objectively reports the findings, often with attending figures and tables; and a *Discussion* section that restates the results in the context laid out in the Introduction, along with a well-referenced description of the implications of the work given the range of existing relevant studies. In some cases a faculty mentor might approve departures from this format. Reading the scientific literature in preparation for writing the thesis should begin long before attempting to write, in fact even before performing research. The student should write the Master's thesis under the close guidance of the faculty mentor. This will generally involve multiple drafts and successive revisions following mentor comments and suggestions. Most students should expect to spend a full term just writing the research thesis, after research is complete. When the faculty mentor approves a draft of the thesis as being complete and ready to defend, the student may attend to formatting (see below), add a title page (as found at the end of this document), and submit the thesis to the committee.

The student should communicate with the faculty mentor and all thesis committee members to decide upon a date and time for the thesis presentation and defense. The student should set aside and schedule three hours for this event, although it does not usually exceed two hours. Scheduling should be done only with the approval of the thesis mentor, taking into account what remains (if anything) to be done before the thesis is complete. The final form of the thesis, approved by the mentor, should be submitted to the committee at least seven days before the defense. See "Deadlines and Final Approval Process", below, for more constraints on scheduling. The event has two components: a public oral presentation of research, and a private defense of the presentation and thesis before the thesis committee.

The oral presentation is a synopsis of the research, in a professional form typical of invited colloquium lectures and conference presentations. It is usually accompanied by a slideshow. Students should aim for a 30-40 minute presentation. Master's presentations are advertised in the department, and the public are invited to attend. After the presentation, the student will field questions from the audience. After this, all attendees will depart besides the student and the thesis committee. At this point, the defense begins, when the student will answer questions and respond to criticism of both the oral presentation and (especially) the written thesis. This is presided over by the chair who will, after all discussion is finished, ask the student to leave the room. The thesis committee will then discuss the merits of the thesis and research and the performance of the student. The aim of this conversation is for the committee to provide advice to the thesis committee chair as to the status of the defense and any recommended revisions to the thesis. The decision may be that the student (1) passes the thesis defense as is, without any revisions; (2) passes the thesis defense with revisions; or (3) fails the defense. A student who fails the defense will not be permitted to reschedule a second defense. Most students pass with revisions; in

this case the committee will decide the extent of revisions and how many committee members need to see them, presided over by the chair. Revisions may range from wording changes in the thesis, to additional research or another oral presentation. The thesis committee will decide on a reasonable time frame for the revisions.

Upon successful completion of the defense and all revisions, the chair of the thesis committee (and the research mentor if different) will sign and date the title page of the thesis and submit the complete document in electronic form to the Graduate Advisor. Upon receipt of the signed thesis, the Graduate Advisor will fill out a Thesis Approval Form and submit it along with the thesis to the Dean of Mathematics and Natural Sciences, who will forward the form to the Registrar as official approval that the final examination is complete. Also, if all other requirements for the Master's degree have been met, the Graduate Advisor will recommend to the Registrar's office approval of graduation for that term, assuming the student was matriculated that term and filed for graduation on time. The final form of the thesis will be made available online, unless the faculty mentor requests a delay. The student will then be encouraged to deposit the thesis in CUNY AcademicWorks (see "Open Access...", below). For more information see "Deadlines and Final Approval Process", below.

Format of the Master's Thesis

- The thesis should have only the student as an author. When referring to the researcher is necessary, the first person singular should be used if it is appropriate. Portions of the research that were performed by others or in collaboration with others can be represented in one of three ways, at the discretion of the research mentor: (1) still in the first person singular, along with mention of others in an Acknowledgments section; (2) referring to collaborators with initials, mentioning "see Acknowledgments" the first time a collaborator is mentioned; or (3) in the passive voice which requires no mention of the researchers.
- The thesis should be typewritten, in font size 12, and double-spaced.
- In accordance with Graduate Division and College Library stipulations, the left margin must be 1.5 inches deep. It is recommended that the top, right and bottom margins be at least 1.0 inch deep.
- The thesis should be organized in major sections in the following order: Title Page (according to the template at the end of this document), Abstract, Introduction, Materials and Methods, Results, Discussion, References, Appendices.
- With the exception of the Title Page, all pages must be numbered consecutively at the bottom center of each page. The Abstract page should be page number 1.
- A Copyright Statement Page can appear immediately after the Title Page (see "Copyright", below). This page should not have a page number.
- If the thesis is relatively long and contains several named sections atypical of a research paper, a Table of Contents should be included. This should be page number i.
- Where desirable and appropriate, an Acknowledgments section may be included. In such case, the Acknowledgments page(s) should follow the title or copyright page and appear as page i. If a Table of Content is included, the Acknowledgments page should follow the Table of Contents and be numbered as page ii.
- All figures should include comprehensive legends. Tables and figures should be embedded in the text at appropriate places. A table or figure may be on its own page if desired. All tables and figures should be cited in the text.
- All cited references should be listed in alphabetical order in the Reference section in a professional format that includes full publication title and all author names. Formats where references are numbered should not be used.

Final Examination Requirements of the COURSE-INTENSIVE TRACK: **The Literature Review**

Students in the Master's program who intend to graduate on the course-intensive track must have a faculty mentor who is willing to serve as supervisor, to provide advisement in the writing and defense of a topical scientific literature review, and to serve as chairperson for the final examination committee. Any full-time faculty member of the QC Biology Department (either Lecturer or Professor) can be a mentor for a Master's student in the course-intensive track.

Once a faculty member agrees to be the student's mentor, the two will decide together on a topic that the student will investigate and write a literature review. When seeking a mentor, students should be aware that usually the research project will relate at least generally to the faculty mentor's existing research program or interests. This option is designed to ensure that candidates have mastered in-depth knowledge in a particular area of biological research. The student should read the primary literature comprehensively in the research area, and construct a document of no less than 25 double-spaced pages. The work should be definitive as far as what is currently known on the topic, and should be of a nature and quality that would justify peer reviewed publication in a professional scientific journal. The student should write the document under the close guidance of the faculty mentor. This will generally involve multiple drafts and successive revisions following mentor comments and suggestions. Most students should expect to spend at least a full term writing the literature review after substantial reading; usually more time is needed. The literature review may be formatted at the discretion of the faculty mentor, provided it is thoroughly referenced, and has a title page, the template for which is at the end of this document.

At some point during the student's writing, a final examination committee should be assembled by the student with the guidance of the faculty mentor. The committee will consist of the faculty member who is the chair of the committee; and at least two other full-time faculty members at Queens College. Usually these will be in the Biology Department, but occasionally another department. When the faculty mentor approves a draft of the literature review as being complete and ready to defend, the student can submit the document to the committee.

The student should communicate with the faculty mentor and committee members to decide upon a date and time for the presentation and defense. The student should set aside and schedule three hours for this event, although it does not usually exceed two hours. Scheduling should be done only with the approval of the faculty mentor. The final form of the literature review, approved by the mentor, should be submitted to the committee at least seven days before the defense. See "Deadlines and Final Approval Process", below, for more constraints on scheduling. The event has two components: an oral presentation, and a defense of the presentation and literature review before the final examination committee.

The oral presentation is a synopsis of the literature review, in a professional form typical of invited colloquium lectures and conference presentations. It is usually accompanied by a slideshow. Students should aim for a 30-40 minute presentation. After the presentation, the defense begins, when the student will answer questions and respond to criticism of both the oral presentation and (especially) the written document. Candidates are expected to have done sufficient reading in the field to be able to address fundamental questions on the topic. The defense is presided over by the chair who will, after all discussion is finished, ask the student to leave the room. The committee will then discuss the merits of the literature review and presentation. The aim of this conversation is for the committee to provide advice to the chair as to the status of the defense and any recommended revisions to the literature

review. The decision may be that the student (1) passes the defense as is, without any revisions; (2) passes the defense with revisions; or (3) fails the defense. A student who fails the defense will not be permitted to reschedule a second defense. Most students pass with revisions; in this case the committee will decide the extent of revisions and how many committee members need to see them, presided over by the chair. Revisions may range from wording changes to additional reading or another oral presentation. The thesis committee will decide on a reasonable time frame for the revisions.

Upon successful completion of the defense and all revisions, the faculty mentor will sign and date the title page and submit the complete document in electronic form to the Graduate Advisor. Upon receipt of the signed literature review, the Graduate Advisor will send it to the Dean of Mathematics and Natural Sciences, who will contact the Registrar with approval that the final examination is complete. Also, if all other requirements for the Master's degree have been met, the Graduate Advisor will recommend to the Registrar's office approval of graduation for that term, assuming the student was matriculated that term and filed for graduation on time.

Deadlines and Final Approval Process:

- The student must be matriculated in the Master's program on the particular term in which graduation is expected.
- The student must file for graduation online by the Registrar's deadline for the particular term. Any student who files for graduation will be judged as approved or not approved for graduation by the QC Administration (on the basis of financial status and credits) as well as the Biology Department (on the basis of degree requirements). If the final examination component (thesis or literature review, oral presentation, and defense) is not completed by the time of applying for graduation, or if there are credits pending that term, approval will be tentative.
- The student must submit to the committee the literature review or the Master's thesis in the form to be examined, no later than a week before the projected defense date.
- The defense must be held on or before the last day of the semester in which the student plans to graduate. However, any revisions or additional requirements stemming from the defense must be fulfilled prior to the end of term, to permit graduation that semester. Therefore students should pick a defense date that provides ample time for revisions before the end of term.
- The final form of the thesis or literature review, with front page signed by the student's committee chair, must be submitted for departmental approval by the last day of term. This signed submission indicates that the final examination component of the Master's degree (thesis or literature review, oral presentation, and defense) is completed to the chair's satisfaction in consultation with the committee. Submit the document to the QC Biology graduate advisor (Dr. David Lahti (david.lahti@qc.cuny.edu)) in electronic form.

Name on Diploma

Your name on your diploma will be the same as your official name as registered with Queens College. If you choose to represent your name differently on your diploma, visit QC Hub with appropriate documentation and the following form filled out:

<https://www.qc.cuny.edu/registrar/Documents/NameChangeorCorrectionForm.pdf>

Copyright

Student theses and literature reviews are copyrighted as soon as they are submitted to the Department. Students are not required to register their copyright with the U.S. Copyright Office to enjoy protection. However, students may still opt to register their work with the Copyright Office online:

<http://www.copyright.gov/eco/>

Academic Integrity

Students have the responsibility to acknowledge explicitly, whether through citation or in the Acknowledgments, any facts, ideas, language, images, or other materials that appear in their thesis that originated with or were contributed by other people. Students should refer to the CUNY Academic Integrity Policy for more information:

<https://www.cuny.edu/about/administration/offices/legal-affairs/policies-procedures/academic-integrity-policy/>

Open Access to QC Biology Master's Theses

Theses submitted as partial fulfillment of an advanced degree at a public institution cannot normally be held as confidential by the student, mentor, or department; in fact, they are increasingly made freely available to the public (Open Access). In keeping with this, except in extraordinary circumstances, all Master's theses will be made available online via the Departmental Website. In addition, all Master's graduates with research theses are encouraged to deposit them in CUNY AcademicWorks, which is covered by academic search engines. More information and instructions can be found at: <https://qc-cuny.libguides.com/caw-theses>

Thesis Binding

Binding a Master's thesis into a hardcopy is now optional at Queens College. A student who wishes for one or more hardcopies of a thesis can consult the library's Thesis & Binding page for more information: <https://library.qc.cuny.edu/services/binding/>. The QC Library does not bind literature reviews.



{research track title/signature page template:}

**EXPERIMENTS IN PLANT HYBRIDIZATION: BEING AN INVESTIGATION OF THE MECHANISMS OF
INHERITANCE OF THE GARDEN PEA (*PISUM SATIVUM*)**

by

Gregor Mendel

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts in Biology

Queens College
The City University of New York

April 1866

Approved by _____
Committee Chair

Signature

Date: _____

{Note: in the uncommon case when the thesis committee chair is not the student's mentor, add two additional lines to represent the mentor's name, signature and date as well.}

{coursework track title/signature page template:}

**EXPERIMENTS IN PLANT HYBRIDIZATION: BEING AN INVESTIGATION OF THE MECHANISMS OF
INHERITANCE OF THE GARDEN PEA (*PISUM SATIVUM*)**

by

Gregor Mendel

A literature review submitted in partial fulfillment of the requirements for the degree of

Master of Arts in Biology

Queens College
The City University of New York

April 1866

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Signature

Date: _____

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