CENTRE FOR BIOTECHNOLOGY
BROCK UNIVERSITY

GRADUATE HANDBOOK
(2025)

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Introduction and General Information

Welcome to the Centre for Biotechnology at Brock University. We hope that you will have a stimulating and enjoyable experience as a Graduate Student.

The Centre for Biotechnology provides facilities for students working towards their Master and/or Doctoral degrees in Biotechnology. In this document you will find information that is specific to the procedures and practices within the Centre for Biotechnology. Most aspects of a Graduate Student's career at Brock are governed by University Regulations.

Important resources for graduate students and faculty members include but are not limited to:

- Center for Biotechnology webpage: Centre for Biotechnology (brocku.ca)
- Resources for Faculty of Math & Science Graduate Students: Resources for Current Graduate Students – Faculty of Mathematics & Science (brocku.ca)
- Academic Calendar: Brock University Web Calendars
- The Faculty of Graduate Studies: Graduate Studies (brocku.ca)
- Brock University's Faculty Handbook: Faculty Handbook – University Secretariat (brocku.ca)
- Graduate Student Association: Graduate Students' Association (brocku.ca)
- Student Wellness and Accessibility Centre: https://brocku.ca/health-wellness-accessibility/
- Brock International: International (brocku.ca)
- Academic Integrity Office: Studying with integrity – graduate – Academic Integrity (brocku.ca)

Program Description

The graduate programs offered by the Centre for Biotechnology encompass the broad fields of chemical and gene biotechnology. These fields are interdisciplinary in nature and collaboration between participating faculty and departments is encouraged. Chemical Biotechnology involves the use of the tools and techniques of chemistry to understand and manipulate biological processes. Gene Biotechnology involves the use of DNA technology, bioinformatics and microbiological techniques to study biological phenomena. Graduates of these programs work in such areas as pharmaceuticals and related human health activities, food science and nutritional biochemistry, environment, energy, as well as biotechnological related issues of finance and policy.

Each student will be assigned a supervisory committee composed of three members from at least two of the departments participating in the program. The student will meet with the committee at the start of their program, and on a regular basis for the duration of their program of study (see details in the Schedule for Supervisory Committee Meetings section). Each meeting will involve the presentation by the student of a report on research objectives and progress, and discussion with the committee on the realization of these goals. In addition, each MSc student will present a research level public seminar during their tenure in the program and each PhD student will present two research level public seminars.

Students will participate in the running of undergraduate courses in the Departments of Biological Sciences and/or Chemistry at Brock University as teaching assistants for a minimum of one term (for which a graduate teaching stipend will be received).

Program Requirements - MSc

Admission to the program requires successful completion of an Honours Bachelor's degree, or equivalent, normally with an average of not less than 78%, or the equivalent grade point average in major

courses in an undergraduate program in biotechnology, chemistry or the biological sciences (composed of but not limited to biochemistry, biology, genetics, or microbiology).

The program is designed to provide a broad background in the cognate basic disciplines of biotechnology (chemistry and biology). Students with undergraduate degrees in chemistry or the biological sciences will be exposed to the breadth of biotechnology through mandatory participation in the seminar program and will have the opportunity to focus on selected areas of biotechnology in other graduate courses.

Required courses

MSc students are required to complete BTEC 5F90 and BTEC 5P95. As part of BTEC 5F90, every MSc candidate must prepare and defend a thesis which demonstrates a capacity for independent work of acceptable scientific calibre. Students must enrol in BTEC 5F90 each term. Three additional half-credits are required, two of which must be numbered 5P00 or higher and one of which may be numbered 4P00 or higher. Normally, only one of these three additional half-credit courses may be taken from among 5P00 or 4P00 level courses offered by the Departments of Biological Sciences, Chemistry or Physics, which are not cross-listed with the Biotechnology program.

Courses are chosen in consultation with the Supervisory Committee. The thesis supervisor may not offer all the courses in a candidate's program. Additional credits may be required of candidates with insufficient preparation in the area of research specialization at the discretion of the supervisory committee. Note that obtaining a grade less than 70% in a graduate course is sufficient grounds for dismissal from the program.

Transferring from the MSc to the PhD program

Students may also be permitted to enter the PhD after successfully completing a minimum of one year in the Brock Biotechnologies MSc program. Approval to enter the PhD program may be given by the Graduate Program Director after having received a favourable written report from the student’s supervisory committee. Typically, the acceptable candidate would have achieved the successful completion of at least one full credit towards the degree with an average above 80% AND one seminar as part of the BTEC Seminar course (BTEC 5P95). After transfer to the PhD program candidates must complete the PhD Candidacy Exam by the end of the third year since the start of the MSc program. Those who fail the PhD Candidacy Exam will be rolled back to the MSc program and have one more term (beyond the term when the exam was taken) to complete the MSc program, during which the university funding may no longer be available while the Research Fellowship may be available at the discretion of the supervisor.

Program Requirements – PhD

Successful completion of an appropriate Master's degree in Biotechnology, Biophysics, Chemistry or the Biological Sciences (composed of but not limited to Biochemistry, Biology, Genetics or Microbiology) is required. Alternatively, students who have successfully completed a minimum of one year in the Brock MSc Biotechnology program may apply to be transferred to the PhD program. In this event, registration in BTEC 5F90 will continue as registration in BTEC 7F99.

In addition, students with exceptional research potential and unquestionably superior academic standing who hold an Honours BSc or equivalent may be admitted into the PhD program. Research potential is gauged by (i) strong undergraduate research experiences, (ii) publications, (iii) graduate scholarships, (iv) examples of the applicants scientific writing.

Continued enrolment in the PhD program requires the successful completion of the candidacy examination, which should take place normally by the end of the 6th term of enrolment in the PhD program or after the second term but no later than the nineth term for students transferring from MSc, by following the procedures defined in the "PhD Candidacy exam regulations" section of this handbook.

All students must complete a research project that culminates in a thesis and independent thought and work, and which represents an original contribution to scientific knowledge. There will be an oral defence of the written thesis. The student will be guided in all aspects of his or her graduate program by a supervisory committee. Students registered as full-time will be expected to complete all degree requirements within four years following entry into the PhD program.

Required courses

PhD students are required to complete BTEC 7F99 and BTEC 7P96. Students must enrol in BTEC 7F99 each term, while BTEC 7P96 is to be taken in the first year of the program.

Students approved to transfer from the MSc program are required to complete a total of four additional half-credits, three of which must be numbered 5P00 or higher and one of which may be numbered 4P00 or higher. One of these four half-credit courses should be taken from an instructor whose home department is not the one in which the student's research work is located. Normally, only one of these four half-credit courses may be taken from among 5(alpha)00 or 4(alpha)00 level courses offered by the Departments of Biological Sciences, Chemistry or Physics, which are not cross-listed with the Biotechnology program.

Students with a completed MSc are required to complete three additional half-credits, two of which must be numbered 5(alpha)00 or higher and one of which may be numbered 4(alpha)00 or higher. One of these three half-credit courses should be taken from an instructor whose home department is not the one in which the student's research work is located. Normally, only one of these three half-credit courses may be taken from among 5(alpha)00 or 4(alpha)00 level courses offered by the Departments of Biological Sciences, Chemistry or Physics, that are not cross-listed with the Biotechnology program.

The thesis supervisor may not offer all the courses in a candidate's program. When appropriate and with prior permission of the supervisory committee, courses offered outside the Departments of Biological Sciences and Chemistry may be taken to fulfill course requirements. Note that graduate credit is not given in courses where the final grade is less than 70%. Students should strive to achieve a minimum grade of 80% in all their graduate courses.

Minimum course grades

0-49% Fail
50-69% Pass – no graduate credit (course must be replaced or retaken if graduate credit is required)
70-79% B – graduate credit awarded, insufficient for transfer from MSc to PhD
80-100% A – required for transfer from MSc to PhD

Composition of thesis supervisory committees (applicable to both MSc and PhD)

All students are supervised by a thesis committee. Thesis committees usually consist of the student's research supervisor (and applicable co-supervisor) and two additional faculty members from the Centre for Biotechnology, one of whom will serve as Chair of the Committee. Exceptions to this structure occur when the supervisor's primary appointment is not in Biological Sciences or Chemistry.

Thesis committees will be chosen according to the following criteria, based on suggestions made by supervisor (and applicable co-supervisor) and subject to approval by the Graduate Program Director to ensure that the following criteria are fulfilled in assigning thesis committee duties:

1. There are 2 major research areas in the Centre. At least one committee member will be from the same research area as the student and the supervisor.
2. Thesis supervisory committees consist of the supervisor or co-supervisors plus at least two members of the Biology and Chemistry Graduate Programs faculty. At least one of the additional committee members should be from a cognate discipline. In the case where a co-supervision is involved, it is optional to have the 2nd committee member for a MSc student.
3. Cross-appointed faculty in Biological Sciences and Chemistry may supervise graduate students and may be members of thesis supervisory committees.
4. Adjunct faculty in Biological Sciences and Chemistry may co-supervise graduate students with faculty from Biological Sciences and Chemistry. Adjunct faculty may be members of thesis supervisory committees. In this case, at the discretion of the supervisor/co-supervisor, it is optional to have the second committee member for a MSc student.

Schedule for Supervisory Committee Meetings (applicable to both MSc and PhD)

Students are responsible for calling and arranging their committee meetings according to the following schedule:

1. First meeting (planning): preferably within 2 months, no later than 4 months after initial registration
2. First progress meeting: second or third term after initial registration
3. Subsequent progress meetings: minimally one per year.

Supervisory committee meetings must also be held to discuss PhD Candidacy exam topics and for major changes in research plans if not possible as part of regular committee meetings. Most committee meetings last 1-2 hours in length, so a 2-hour time slot should be scheduled.

At each meeting, students should present their research plans and progress in the form of a ppt presentation.
The presentation should be approximately 30 minutes in length (depending on progress through your degree, this time may be longer if data analysis is extensive) and contain the following information:

1. Title of thesis
2. Project objectives/questions/hypothesis to be researched
3. Background literature discussion to put the project into context of the current understanding in the research field
4. Methodology to be used to answer the research questions
5. Results from your research which will include samples of raw data, analysed/summarised data, statistical analyses
6. Timeline for project objectives
7. Course work taken (with grades) and to be taken

Monitoring of Graduate Student Progress (applicable to both MSc and PhD)

Graduate student committee meetings as specified above must be documented with the Graduate Student Progress Report Form (available on the Biotechnology web page). The outcome of the meeting will be summarized by the committee as Satisfactory, Needs Monitoring, Unsatisfactory, or Problems with spoken English / written English. Students should be aware that it is their responsibility to make sure committee meetings take place, and that their progress is monitored by the Biotechnology Graduate Committee. The GPD has the right not to sign course registration forms for students who failed to have the required committee meetings without legitimate reasons.

It is very important that students convene their committees and present evidence of satisfactory research effort and progress. The Graduate Program Committee regularly checks individual student progress as reported on the Graduate Student Progress Form. If no evidence of satisfactory progress is provided, then the Committee will assume that this is because the student has not been making progress. Also, from time to time, the Faculty of Graduate Studies asks the GPD to confirm satisfactory progress, for instance, when considering applications for bursaries.

PhD students are required to complete an electronic PhD Progress Report for the Faculty of Graduate Studies (FGS) every three terms of their PhD studies outlining their progress for the last three academic terms (inclusive of the current term).

Graduate students receiving external scholarships must have their satisfactory yearly Graduate Student External Progress Report Form sent to the scholarship agency by the Graduate Studies Office in order to continue receiving external scholarship funding. This form is available from the university graduate studies website.

Academic Probation

When a student's progress is unsatisfactory, supervisory committees can recommend to the Graduate Program Director that students be placed on academic probation or even asked to leave the program in accordance with section 7.13 of the Graduate Academic Regulations, Brock University Faculty Handbook.

In graduate programs with a research exit requirement (thesis, major essay/research paper), satisfactory academic progress during the research phase will be determined through academic progress reviews by the Graduate Program Director. An unsatisfactory academic progress decision, as determined by the Supervisory Committee and Graduate Program Director, may result in a program's decision to place the student on academic probation for the subsequent term or a request for required program withdrawal.

PhD Candidacy exam regulations

Enrolment in the Doctor of Philosophy program requires the successful completion of a PhD Candidacy examination. The PhD Candidacy examination will include an oral exam on the student's written research proposal, including the scientific background appropriate to the proposal. The research proposal must focus on a topic that is not the student's primary research topic, but is in a field related to the student's PhD research. The topic should be chosen in consultation with the thesis supervisory committee at a meeting preceding the PhD Candidacy exam. Normally, students will present to their supervisory committee up to 3 possible topics with a brief description for each topic to cover the long term and specific short-term objectives. The supervisory committee will advise on the appropriateness of the proposed topics and select one for the student. Students are allowed no more than 6 weeks to complete the written component of the PhD Candidacy exam. The thesis supervisory committee will fill out the PhD Candidacy Topic Approval Form (available on the Biotechnology web page) to approve the topic of the exam and forward this to the Graduate Program Director. The GPD will form the examination committee by inviting two external examiners based on the supervisory committee's recommendation. The student will submit an electronic copy of the written proposal via email to the Graduate Program Director and the examination

committee members within six weeks of the date of topic approval; the scheduled examination date will occur within 3 weeks following this submission.

Conditions for the exam

Before permission is given for the PhD Candidacy Exam to proceed, students (both MSc and PhD) should convene their supervisory committee in order to convince them that sufficient research progress has been made up to that point; this is particularly critical for MSc students as they must convince their committees that their academic abilities and achievements up to that point justify switching to the PhD program without first producing an MSc thesis. The supervisory committee will then advise the Graduate Program Director of their decision to grant permission for the PhD Candidacy examination to proceed via the approval of the topic area as described above.

It is desirable but not mandatory that PhD students complete their course requirements before attempting the PhD Candidacy exam. MSc students must complete all MSc course work with grades of at least 80% **in each course**. Exceptions to this rule may be made if required courses have not been offered in time for students to complete this requirement.

Timing of the exam

For students who enter directly into the PhD program, the PhD Candidacy exam will take place after the second term but no later than the nineth term. For students enrolled in the MSc program who wish to switch to the PhD program, the PhD Candidacy exam will take place after the third term but no later than sixth term.

Important: PhD students who fail to arrange the PhD Candidacy exam before the end of their sixth term, will be deemed to have failed their first attempt at the exam.

Content and format of PhD Candidacy research proposal

The proposal will follow NSERC guidelines and must be formatted as required for Discovery Grant Form 101, including all relevant sections (but NOT including Form 100). Consult the NSERC website for information on how to write a good proposal. It is highly recommended that you obtain a copy of a successful NSERC Discovery Grant proposal written by your supervisor as an example of how a proposal should be framed.

The PhD Candidacy research proposal must be written by the student and must not be read or edited by the supervisor and supervisory committee members prior to its final submission, to ensure that the proposal reflects the student's own work. Students are expected to work independently in writing their proposals, but are allowed to have their peers proofread the last draft before submission. Students may also consult with the Graduate Program Director about issues relating to formatting and grant structure (as opposed to specific content), as well as criteria for the PhD Candidacy evaluation.

Note that the proposal must be understandable to a biologist and/or chemist in a different research field.

1. Topic

The PhD Candidacy proposal should be on a topic related to but not the same as the PhD research topic. The proposal should be narrow enough in scope that it represents a project that could be used as a backup should the student’s primary research project be abandoned or could be used as a post-doctoral project. As such, the topic should be focussed enough that the proposed research could be accomplished in a 5-year timeframe.

2. Summary of proposal in lay terms

The summary is intended to explain the proposal in language that the public can understand. Using the space provided in the NSERC form 101 and in simple terms, briefly describe the nature of the work to be done. Indicate why and to whom the research is important, the anticipated outcomes, and how your field will benefit. In general, it is desirable to avoid field-specific jargons wherever possible in your proposal.

3. Proposal

Using the headings below, describe the research to be supported. This section of the proposal is a maximum of 5 pages in length, single-spaced, Times Roman 12-point font. References should be provided in full on additional pages. You may also present up to three figures and tables. Provide details on:

- objectives of the research, both short and long term; hypotheses to be tested, specific predictions
- literature pertinent to the proposal
- methods and proposed approach
- anticipated significance of the work.

4. References

- Please use standard and consistent formatting for references.
- Do not refer readers to Web sites for additional information on your proposal.
- Do not introduce hyperlinks into your list of references.
- Make sure you have actually read the references in your proposal – you may be questioned on them in the exam!

5. HQP plan, budget, and budget justification

- Following the NSERC guidelines, describe in no more than two pages the recruitment and assignment of High Quality Personnel (HQP) to the proposed research components as well as HQP training strategies.
- Provide a budget by filling in the budget portion of NSERC Form 101 and provide justification of the expense items using no more than 1 page.

PhD Candidacy examining committee

The Committee consists of the student's supervisory committee plus two faculty members from the Department of Biological Sciences and/or Chemistry. Majority of the committee members must be tenured faculty. The GPD serves as Committee Chair and is also an examiner and therefore votes on the outcome. Co-supervisory votes together and count as a single vote in all cases.

Exam procedures and outcomes

The examination will consist of two parts, the written research proposal and the oral exam. A student has to succeed in both parts to pass the PhD Candidacy exam and has to first pass the written part before proceeding to the oral exam.

Committee members will submit their evaluations with a pass or fail grade (with additional applicable detailed comments) for the written research proposal to the Graduate Program Director no later than 3 days prior to the scheduled oral exam. A pass requires at least 4 members of the committee voting for pass. If the written research proposal fails to pass, the oral exam will be cancelled, and the student will be given ONE chance to revise and resubmit the research proposal, normally within two weeks. The committee's review

comments will be communicated to the student via the GPD. The committee will be given two weeks to re-evaluate the revised research proposal. If the proposal fails to pass again, the PhD Candidacy exam will be considered as a failure, and the student will not be allowed to re-try.

The oral exams are scheduled for a 3-hour duration, which is longer than most exams last. The exam begins with a 30-minute oral presentation by the candidate, highlighting and summarizing the proposed research. This presentation is followed by rounds of questions from the committee, beginning with the two external examiners, and ending with the supervisor. Normally, two rounds of questioning are sufficient, but three rounds of questioning may be necessary.

The outcome of the oral exam will be determined by the votes of the committee (pass or fail). The oral exam is a one-chance exam, thus a failure of the oral exam is also a failure of the PhD Candidacy exam.

1. Students registered in the PhD program: possible outcomes are **Withdraw** or **Continue.**

· **Withdraw from PhD program** - two or more committee members vote to fail (the candidate will be required to withdraw from the program by the end of the current term). This outcome will normally only apply when the committee deems it extremely improbable that the student will be able to independently plan, carry out, and publish a research project.

· **Continue** - at least 4 members of the committee vote for a pass. The student has demonstrated sufficient understanding of the research process, satisfactory understanding of the research topic, and has demonstrated satisfactory scientific, written and oral communications skills, such that the student is clearly ready to independently plan, carry out, and publish a research program. The student may continue in the PhD program.

2. Students registered in the MSc program: possible outcomes are **Remain in MSc** or **Transfer to PhD**

· **Remain in the MSc program** - 2 or more committee members vote that the candidate will be better served by completing an MSc thesis prior to undertaking a PhD. The student has not demonstrated sufficient understanding of the research process or satisfactory understanding of the research topic, and/or has not demonstrated sufficient ability in either writing or communications skills. The student is not yet ready to independently plan, carry out, and publish a research program.

· **Transfer to PhD** program - at least 4 members of the committee vote for a pass. The criterion for a **pass** is clear evidence of advanced intellectual ability and accomplishment, as indicated by the written proposal and oral exam, such that the committee believes the student will not benefit from the experience of writing an MSc thesis. The student has demonstrated sufficient understanding of the research process, satisfactory understanding of the research topic, and has demonstrated satisfactory scientific, written and oral communications skills, such that the student is clearly ready to independently plan, carry out, and publish a research program.

Thesis procedures (applicable for both MSc and PhD)

The following are general guidelines that reflect what Biotechnology supervisory committees generally deem to be reasonable minima and maxima for thesis content. It is not necessary to include all of the work you did as a graduate student. Your goal is to demonstrate sufficient achievement to justify awarding of the degree.

MSc thesis: General introduction, 1-2 data chapters (or chapters representing manuscripts, unpublished or published), general discussion, general conclusions, references, appendices as necessary. Total thesis length about 100-125 pages.

PhD thesis: General introduction, 3-5 data chapters (or chapters representing manuscripts, unpublished or published), general discussion, general conclusions, references, appendices as necessary. Total thesis length about 150-200 pages.

Students are responsible for convening their committees in order to regularly apprise them of their progress. The committee will decide when the student has collected sufficient data to complete a thesis. The committee's decision will be indicated on the Graduate Student Progress Form (available from the Biotechnology web site) and forwarded to the Graduate Program Director.

Formatting of graduate theses

The following guidelines are intended to **complement** the requirements of the Faculty of Graduate Studies. Biotechnology committees regularly request that all references be collated at the end of the thesis, to improve the clarity of the monograph. Students who insist on formatting theses their own way are likely to encounter opposition and irritation from committee members (hint: don't do it!).

1. All aspects of thesis formatting and e-submission should follow the Brock University Library guidelines for E-Thesis Submission. For detailed instructions please visit the Thesis Preparation webpage of the Faculty of Graduate Statues.

2. When printed copies of theses are to be provided for the supervisory and defence committee, they should be printed as double-sided on laser printers. Bound copies of theses in the final version are students' own choices and are no longer required.

3. All typing and other costs of preparing the thesis are the responsibility of the student. Students are not permitted to use the departmental laser printers and photocopiers for printing/duplicating their theses, but can use the printer in the graduate student lounge.

4. Published manuscripts are likely to have different formatting. When included as thesis chapters, one consistent format should be used throughout the thesis, and all references should be compiled at the end of the thesis.

Final Draft Submission for Tuition Reduction (Graduate Studies Final Stage Status)

Once the student has completed all required courses and completed a final draft of the thesis and it has been reviewed by their supervisor, the student can hand in this first draft to the Graduate Program Director along with the final stage form from the Faculty of Graduate Studies to apply for the first draft tuition reduction. **The submission to the GPD should be as a pdf document attached to an email.** The student should request the supervisor to confirm via email to the GPD that they have reviewed the draft to confirm it represents a document that would require less than one term to complete for final review. Students approved for Final Stage Status must be able to complete their exit requirement within the subsequent term. Final Stage Status will be awarded only once and for only one term per Brock University Faculty Handbook, section 7.11.

Internal Thesis Review

Once the supervisor agrees that the thesis is ready for internal review by the supervisory committee, an email to that effect should be forwarded to the Graduate Program Director, and a PDF version of the thesis emailed.

The GPD forwards the thesis to the committee who will evaluate it and decide whether it is ready for external review. The internal review process normally takes three weeks (see below for black-out periods). If the student is required to make major revisions during the internal review process, it may take longer than three weeks. Each committee member forwards comments to the Graduate Program Director who forwards them to the student. The thesis may be submitted for external review once required revisions have been made, as recommended in the internal review.

External Thesis Review and Defence Date

Once the Internal Review is complete, the student should forward an electronic copy of the thesis to the GPD, along with the Declaration of Originality and the following forms:

- For MSc thesis defences, the MSc Appointment of External Examiner form needs to be submitted along with the thesis. Forms and detailed instructions are available on the FMS Student Resources page, under "Arranging MSc Thesis Defence".
- For PhD thesis defences, the Appointment of PhD External Examiner form and the Supervisory Approval of Thesis for Oral Defence form are required. Forms and detailed instructions are available on the FMS Student Resources page under "Arranging PhD thesis defence".

For Doctoral thesis defences, an Internal External Examiner would be appointed by the GPD.

The External Examiner would be a Faculty Member from another university or from Brock University, but outside the Biotechnology graduate program.

The supervisor and student must complete a list of three potential External Examiners and their contact information, ranked in order of preference. The Graduate Program Director reviews and approves the list of potential external examiners for MSc thesis defences on behalf of the FMS Associate Dean. External Examiners' list for PhD thesis defences is approved by the Associate Dean, FGS.

Once the external examiners have been named, a defence date will be set. The date will normally be 4-6 weeks from the external examiner notification date and the submission of the thesis for external review.

Electronic copies of the thesis will be distributed to the committee. The student shall have a copy at the defence.

Black-out Periods for Defence and Internal Reviews

Two times of the year are set aside where no thesis defences or internal review procedures will take place. This is to accommodate normal holiday practise and alleviate scheduling difficulties at common university closure periods.

Summer black-out: August 15th to August 31st
Winter black-out: December 18th to January 3rd

Note that students should not submit theses for internal review within these time periods. If submitting prior to these time periods, the "3 week" clock will stop at these time points and return to

normal patterns after the duration of the black-out period. Students are advised to plan ahead. For example, if you wished to defend your thesis on September 1, you would have to submit for external review around the end of June. Likewise, if you wanted to defend on January 5th, you would need to submit for external review by ~November 5th. Remember to add at least 3 weeks for the internal review before that.

Program and funding length limits

The normal program length is 2 years (6 terms) for the MSc program and 4 years (12 terms) for the PhD program, during which the University Scholarship and Research Fellowship funding is guaranteed. Any continuation of the Research Fellowship beyond the normal funding period is at the discretion of the supervisor. The maximum program length is 3 years (9 terms) for full-time MSc students and 6 years (18 terms) for PhD students. MSc to PhD transfer students are guaranteed the University Scholarship and Research Fellowship funding for a total of 5 years (15 terms) and have a maximum of 7 years (21 terms) from the date of enrolment in the MSc program to complete the PhD. The program length for part-time MSc students is prorated to the equivalent of 3 years of full-time. In exceptional cases, application for an extension of the programs beyond these limits may be made. Such requests must be submitted first to the GPD before submission to FGS. Students are strongly advised to complete their programs within the defined normal program periods.

MSc defence format

Examining Committee makeup

- examining committee chair (Dean of Faculty of Mathematics and Science or Dean's delegate), external examiner from outside the university or from outside the program but within Brock University, and all members of the supervisory committee. In case of co-supervision, the supervisors vote together as one vote. Virtual attendance at the defence is allowed.

Format of exam

- Exam chair introduces committee and candidate, explains the format of the defence.
- Candidate presents a research seminar, around 30 minutes in length, followed by a short period in which the floor is open to questions from the audience.
- After a short break, the examination begins. Audience may remain but may not ask questions.
- Order of questioning is usually external examiner, 1st departmental representative, 2nd departmental representative, supervisor. The chair of the examining committee is not required to participate in the questioning period.
- The questioning period is normally about 2 hours, consisting of two rounds of questioning by the examining committee. However, the exam may be longer if the committee deems it necessary.
- When the committee is satisfied with the questioning, the Chair thanks the candidate and the audience, who then leave the room so that the Committee may deliberate *in camera.*

Possible outcomes of the exam

All members of the examining committee will vote on the outcome of the exam except the Chair, for a total of 4 votes.

If at least 3 members of the committee vote to fail, the result is FAIL.
If at least 3 members of the committee vote to pass, the result is PASS.
In the event of a tie vote (usually, 2 votes for pass, 2 votes for fail), the vote of the external examiner will be the outcome of the exam.

PhD defence format

Examining Committee makeup

- examining committee chair (Dean of Faculty of Graduate Studies or delegate), external examiner (from outside Brock University), Brock internal examiner (from outside the graduate program but within Brock University), and all members of the supervisory committee. In case of co-supervision, the supervisors vote together as one vote.

Note that for PhD exams, video attendance by the external examiner is not acceptable except in case of last minute travel emergencies or government travel restrictions.

Format of the thesis defense oral exam

- Exam chair introduces committee and candidate, explains the format of the defence.
- Candidate presents a research seminar, around 30 minutes in length.
- Floor is open to questions from the audience.
- This is followed by a short break (and refreshments).
- The oral defence proceeds. Audience may remain but may not ask questions during the defence.
- Order of questioning is usually external examiner, internal examiner, 1st departmental representative, 2nd departmental representative, supervisor. The chair of the examining committee is not required to participate in the questioning period.
- The questioning period will normally consist of two rounds of questioning by the examining committee, but additional rounds may be required.
- When the committee is satisfied with the questioning, the Chair thanks the candidate and the audience, who then leave the room so that the Committee may deliberate *in camera.*

Possible outcomes of the PhD oral exam

All members of the examining committee, excluding the committee Chair, will vote on the outcome of the exam, for a total of 5 votes. A "Pass" requires at least 4 of 5 voting members of the committee vote to pass. The alternative is "Fail". In the event of a tie vote, the vote of the external examiner will be the outcome of the exam.

After the thesis defence

There are several things that still need to be done after the defense in order for students to graduate.

1. A variety of copyright forms must be filled out and signed by the student. This happens following the thesis defense or once the required revisions are complete, for submission of the thesis to the Brock Digital Repository.
2. The committee may require thesis revisions. These are mandatory and must be submitted by the date decided on at the exam. The exam decision form that is signed by the committee is only signed by the supervisor after the revisions are complete. A Pass Grade for the thesis course is assigned upon supervisor's confirmation that the revisions are complete.
3. Students shall supply their supervisors with copies of the data used in the thesis, as well as other data that were collected in the course of the graduate program, even if they were not included in the thesis. Supervisors are co-owners of data produced in their research labs. Failure to provide data files, copies of field notes, copies of lab books, etc. as requested, may result in a delay in the processing of final paperwork to enable convocation.
4. It is the student's responsibility to submit the final approved version of their thesis to Brock's Digital Repository. The thesis must meet the e-Thesis Format Specifications set by FGS.

(https://brocku.ca/graduate-studies/wp-content/uploads/sites/181/E-Thesis-Format-Specifications-32269-03-2017.pdf)

5. Under certain circumstances (e.g. to protect confidential commercial information, patentable material) a graduate student may request a restriction on the circulation of the thesis for up to a period of twelve months.

Graduate Studies and the University may have additional requirements, such as payment of outstanding fees.

Data ownership and publication rights

Data collected during the course of graduate program belong to both the graduate student and the supervisor. Original data records, including lab books and field books, belong to the supervisor's research program and must remain with the supervisor when the student leaves, unless the student has specifically been given permission to take them. Students are, of course, entitled to keep copies of original data records. Students should submit complete copies of their data to their supervisors at the point of internal review. **The Graduate Program Director will sign off on completion of degree requirements only after supervisors advise that they have received complete versions of all required data, lab books, field books, etc.**

All graduate students are encouraged to produce manuscripts for publication based on their graduate work or any other research that may have been conducted in the course of their graduate program. Graduate students should be aware that first authorship, even for manuscripts based on their thesis, is not automatic, and should discuss with their supervisors how authorship will be assigned. Graduate students who do wish to write manuscripts based on data they collected as part of their graduate research will normally have one year following their departure from the program to provide a complete first manuscript draft of any data they wish to publish. After one year, supervisors may elect to proceed with publication themselves.

Academic Integrity

Graduate students are expected to adhere to the highest of standards during their studies, and according to Brock University's Policy on academic integrity (Academic-Integrity-Policy.pdf (brocku.ca)). Students should familiarise themselves with the policy, the definitions of plagiarism and with the integrity standards expected of a graduate student. These policies apply to their coursework as well as their written thesis work.

All students are required to act ethically and with integrity in academic matters and demonstrate behaviors that support the university's academic values. These behaviors may include, but are not limited to:

a. Completing one's own original work;
b. Knowing and following the appropriate citation method in regard to the use of quotation marks and paraphrasing;
c. Collaborating appropriately (unless teamwork is permitted, it is prohibited);
d. Acknowledging the contribution of others (giving credit);
e. Ensuring that a student's work is not used inappropriately by others;
f. Acting ethically and with integrity while conducting research and in the reporting of research results; and
g. Following published examination rules and protocols.

Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section XVII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the Graduate Calendar, available at http://brocku.ca/webcal to view a fuller description of prohibited actions, and the procedures and penalties.

Use of Phrase Matching Software

Since the Biotechnology Graduate Handbook covers regulations that deal with the program as well as all pertinent information regarding the thesis, it is appropriate to note that the program reserves the right to use phrase matching software to assess the originality of any submitted written work. This procedure applies to thesis submission (with respect to BTEC 5F90/BTEC 7F90), to PhD Candidacy requirements, to research proposal submissions, or to other written work that is part of the Biotechnology graduate program. Careful attention will be paid to ensure that original data from research experiments are not included when using the phrase matching software. Instances of plagiarism will be handled according to the Brock University's policy on academic integrity.

Financial support

Full time students (MSc and PhD) will normally be supported by some combination of provincial or federal scholarships, a research assistantship paid from the research operating grants of supervising faculty, a graduate fellowship from the University, and teaching assistantships in undergraduate courses in the Brock Centre for Biotechnology. In addition, international students may receive bursaries to help offset the cost of higher tuition fees. Students in financial need may qualify for additional bursaries. The purpose of financial support is to allow students to focus on their studies, rather than on undertaking employment unrelated to their studies. The flip side of this is that students should not regard their financial support as an entitlement – it should be regarded as an incentive that needs to be earned.

Note: Graduate fellowships awarded by the Faculty of Graduate Studies differ according to program and according to whether students receive external fellowships and entrance marks. Students should make sure that they understand exactly how they will be supported and for how long. Based on NSERC guidelines, the normal periods of financial support from supervisors' grants (in the form of research assistantships) are 2 years for programs that culminate in an MSc thesis and 4 years for programs that culminate in a PhD thesis (which includes MSc time for students who switch).

Research Fellowships (from the supervisors) are provided at the discretion of the supervisors. They are contingent on the availability of funds and on the demonstration of satisfactory work effort and scientific progress by the student. When students are coming near to the end of their period of financial support, supervisors and students should discuss whether further financial support will be provided.