THE UNIVERSITY OF BRITISH COLUMBIA

Materials Engineering

Contents

Introduction

The Department of Materials Engineering operates three graduate programs:

PhD in Materials Engineering

Masters of Applied Science in Materials Engineering (M.A.Sc.)

Masters of Science in Materials Engineering (M.Sc.)

These graduate programs operate under the policies and procedures of UBC, and the Faculty of Graduate and Postdoctoral Studies (https://vancouver.calendar.ubc.ca/faculties-colleges-and-schools/faculty-graduate-and-postdoctoral-studies).

In addition, the Department provides the following guidelines that concern the formal running of the programs. The latest version of this document can be downloaded from the Departmental website (https://mtrl.ubc.ca/graduate/).

Guidelines for Students Enrolled in the Ph.D. in Materials Engineering

Revised 2024/12/02

1. Each Ph.D. candidate will have a Supervisory Committee consisting of the Research Supervisor(s) and at least two other members. One of the Supervisory Committee members may be from outside the Department. Non-UBC scholars or prominent representatives of industry may join the Supervising Committee after approval by the Dean of the Faculty of Graduate and Postdoctoral Studies

2. A Ph.D. candidate may be required by their Research Supervisor and/or Supervisory Committee to take certain academic courses for credit, depending on the candidate's background in relation to the field of study. The candidate may choose to audit other courses.

3. All candidates must register in MTRL 598 and present at least one research seminar during their Ph.D. program. The seminar is given no later than the third year of study.

4. Registration for MTRL 598 should be made in the year that the presentation is given. Students who have either:

    i) completed a seminar in MTRL 598 as part of a previous M.A.Sc. program or

    ii) completed a seminar in MTRL 598 prior to transferring to the Ph.D. program

    are required to complete a seminar as a Ph.D. candidate. The graduate program assistant should be advised in this situation.

5. Within 12 months of admission to the Ph.D. program each candidate must pass an oral comprehensive examination. Within 24 months each candidate must submit a Research Proposal and defend it in front of the Supervisory Committee. Rules for the Research Proposal/Comprehensive Examination are listed in the Appendix and further detailed here.

6. The Supervisory Committee will meet at least once a year with the student to review their progress. The student is expected to provide a summary of their progress to the committee.

    The PhD supervisory committee must be at least three members.

    The supervisory committee will be formed in year one, typically after the comprehensive exam is completed. The supervisory committee will often be the same team who conducted the comprehensive exam. This supervisory committee will conduct the proposal exam (as currently established), and will be composed of:

    (i) The supervisor(s).
    (ii) At least one 'arms-length' tenured Materials Engineering faculty member (i.e. the Faculty of Graduate and Postdoctoral Studies (G+PS) member, member who has Associate Member status in the Department).
    (iii) A third member, who is approved to be a member of the supervisory committee by G+PS (see the G+PS policy). This will often be another Materials Engineering faculty member but could also be from another academic unit at UBC (including the Okanagan campus), or someone else from industry or academia.

    In some circumstances, additional members and/or changes to the supervisory committee may be appropriate for the student and/or project. You are advised to discuss this with a graduate advisor if you are interested in a larger committee.

7. Candidates for the Ph.D. program are normally expected to complete their thesis within four years of admission.
8. Typically, Ph.D. candidates will be provided a Research Assistantship for a four year period subject to satisfactory progress. An extension of funding may be granted following a review of the student's progress by their supervisory committee.
9. Before preparing a thesis, candidates should read the Dissertation & Thesis Preparation guidelines on the Graduate Studies website
10. The candidate will review a draft of the thesis with their Supervisory Committee, and make necessary modifications. Candidates may be asked to supply a final copy of the thesis to interested Faculty members of Faculty.
11. Not less than 10 days after the thesis is delivered to the committee; the candidate will present and defend the thesis in a Departmental Oral Examination which is convened by the Department Head. The Examining Committee shall consist of at least four faculty members (chair, supervisor(s), and 2 examiners at least one of which must be at the rank of Associate or Full Professor level), a majority of whom will be from the Department of Materials Engineering. Other considerations include ensuring the examiners have sufficient independence from the research project. Other students are welcome to attend the examination and to participate in questioning.
12. After the thesis has been approved by the Examining Committee, and any changes required have been made, the thesis is ready for final examination. The Candidate should follow the Final Doctoral Examination Process provided by the Faculty of Graduate and Postdoctoral Studies.
13. The final Oral Examining Committee consists of the Dean of Graduate Studies or his appointee as Chair, at least 2 members of the candidate's supervisory committee, one other faculty member from the Department of Materials Engineering, one faculty member from another Department, and the External Examiner (usually unable to be present, and their report is presented by the Research Supervisor).
14. Upon satisfactory completion of the oral examination, the candidate will be required to complete revisions specified by the examining committee. Following approval of the corrections by the research supervisor, the thesis should be submitted to Faculty of Graduate and Postdoctoral Studies Office electronically.
15. Prior to leaving the department, the student is expected to meet with their research supervisor to determine whether equipment utilized by the student is to be stored or retained in the laboratory for an incoming or current graduate student. It is the responsibility of the student to compile all research results and samples, including software developed during the Ph.D. program, and hand it over to the research supervisor with proper documentation. The student's desk and surrounding workspace should also be cleared of all research material.

Guidelines for Ph.D. Comprehensive Examination

1. Students need to organize their PhD comprehensive exam prior to starting the second year of their studies.
2. Six to eight topics will be selected for the exam by the supervisor from the general list of exam topics defined for Materials Engineering. Two weeks prior to the exam, the candidate will deliver a one-page brief description of their project together with the exam topics for review by all examination committee members. The exam is chaired by the Department Head of Materials Engineering (or designate); the examining committee (Supervisor + 2 more faculty members from Materials Engineering at least one of

which must be at the rank of Associate or Full Professor) typically becomes the Supervisory Committee after the exam. In a number of cases, it may beneficial to have a supervisory committee that includes one faculty member from outside the MTRL Department who would then replace one of the examining committee members. Interested students may attend the examination as observers.

3. The comprehensive exam will start with a short (5 minute) presentation by the candidate highlighting the topic of their thesis work. This is followed by two rounds of questioning; the questions being taken from the areas identified by the supervisor and candidate for the committee. Typically, for each round each member of the committee (including the supervisor) would pose questions within a 15-minute period (per committee member).

4. Based on the performance of the candidate at the oral examination, the Examining Committee may:

   (a) pass the candidate
   (b) require the candidate to repeat the examination within 4-6 weeks
   (c) advise the candidate to withdraw

   The committee may also recommend additional courses for the candidate to take so as to improve their background in areas of perceived weakness. Having passed the comprehensive examination is a requirement to proceed to the stage of the research proposal defense.

Guidelines for Research Proposal Defense

1. The research proposal defense must be scheduled within the first 2 years of Ph.D. studies.

2. Each candidate for the Ph.D. degree is required to prepare a written research proposal, **not to exceed 24 double-spaced typewritten pages in total length, plus references**. It is expected that candidates will spend not more than 4 months preparing this proposal.

3. The research proposal will normally include a thorough literature survey in the field selected for study and will also include a critical evaluation of previous work, a clear delineation between what is known and unknown, and the selection of a well-defined problem area for investigation. It should also include the methods to be used in solving the problem, as well as a justification of the research as a potentially significant contribution to knowledge. The editing and literary style of the proposal is the candidate's responsibility.

4. The written proposal, if acceptable to the candidate's Research Supervisor(s), will be made available by the candidate to all interested members of faculty. As soon as convenient thereafter, the candidate's Research Supervisor will convene an oral examination of the candidate.

5. The proposal defense will include a 20-to-25-minute oral presentation of the research proposal followed by two rounds of questioning. Questions will focus on assessing the candidate's knowledge specifically related to the research proposal. The overall objective of the examination is to demonstrate to the Committee that the candidate has the ability and background necessary to pursue the proposed research.

6. The Examining Committee will normally consist of the Candidate's Research Supervisor(s), and two examiners at least one of which must be at the rank of Associate or Full Professor. Typically, the Research Supervisor acts as the chair of the Proposal exam. Interested students may attend the examination as observers.

7. Based on the written proposal and on the performance of the candidate at the oral examination, the Examining Committee may:

    (a) accept the proposal
    (b) suggest changes to the research plan
    (c) require the candidate to repeat the proposal defense
    (d) advise the candidate to withdraw.

8. The repeat of the proposal defense shall be chaired by an independent chair and will normally occur 6-8 weeks after the initial examination.

Guidelines for Students Enrolled in the M.A.Sc. and M.Sc. in Materials Engineering

Revised 2024/11/18

1. Each M.A.Sc. and M.Sc. candidate will have a supervisory committee.
   The Masters supervisory committee will be formed within 8 months of the starting the program. The committee will meet, together with the student, in year one of the student's program.

   The Masters supervisory committee will be formed of, at least two members which will be:

   (i) A Research Supervisor who is a faculty member in Materials Engineering
   (ii) A second member, who is approved to be a member of the supervisory committee by G+PS (see the policy). This will often be a Materials Engineering faculty member, but could also be from another academic unit at UBC (including the Okanagan campus), or someone else from industry or academia.

2. The candidate and the Supervisory Committee are expected to meet at an early stage in the program to support the planning of the candidate's research program.

3. The academic courses which must be taken for credit by each candidate will be determined in consultation with their Research Supervisor, and with the approval of the Department Head.

4. The M.A.Sc. and M.Sc. programs are 30 credits in total.

5. The thesis-based course (MTRL 596 – M.Sc. thesis, and 599 – M.A.Sc. thesis) is worth 18 credits.

6. At least 12 credits of course work are required of which at least 6 credits must be graduate courses and the remaining 6 credits either third- or fourth-year courses.

7. 3 credits may be taken in MTRL 593 – Directed Studies.

8. All candidates must register in MTRL 598 and must present a research seminar to satisfy the requirements of the course. Seminars are normally given in the second year of study. Students should register for MTRL 598 in the year that they plan to give their seminar.

9. Upon admission, typically M.A.Sc. and M.Sc. candidates will be offered Research Assistantship appointments for a maximum of 2 years, subject to satisfactory progress by the student. In the unusual case of a student requiring funding beyond the 2 year period, the student must make formal application to the Supervisory Committee for an extension of the funding. It is expected that the M.A.Sc. and M.Sc. program will normally be completed within 18 months of admission.

10. In certain cases, a transfer to the Ph.D. program can be made without completion of the M.A.Sc. or M.Sc. degree. For more information, refer to the Materials Engineering Policy titled: "Transfer of Graduate Students to a Ph.D. Program Before Completion of the M.A.Sc. or M.Sc. Program".

Guidelines for M.A.Sc. and M.Sc. in Materials Engineering Departmental Examination

Revised 2024/12/02

The Master's in Applied Science (M.A.Sc.) and Master's in Science (M.Sc.) in Materials Engineering programs culminate in the production of a thesis which is examined via an oral defense. The structure of this process echoes the University Exam at UBC for Doctoral students.

Purpose of the Final Oral Defence

- To ensure that the student is able to present and defend the thesis and its underlying assumptions, methodology, results, and conclusions in a manner consistent with the Masters degree being sought;
- To communicate the results of the work to the campus community.

Final Oral Defence

All other criteria for the degree should be completed prior to scheduling the final defense.

The student must be in *good standing* to schedule the final defense.

The thesis will be sent to the examiners at least two weeks prior to the final exam.

The structure of the Oral Defence is:

- Student makes a public presentation of the thesis (maximum 25 minutes).
- Examining committee members question the student (two rounds of questions, with up to 15 minutes per examiner in each round).
- Members of the audience question the student (up to 15 minutes, time dependent).
- Examining committee holds an in-camera discussion where it decides the overall recommendation it will make to the Program.
- Chair conveys the recommendations of the examining committee to the student.

The oral defence will take approximately two hours to complete.

Normally, the oral defence will be conducted 'in person', but hybrid and virtual examinations are possible at the discretion of the Chair. A hybrid exam or virtual exam will normally only be permitted if permission is sought at least one week prior to the exam.

Normally, the oral defence is considered a public exam. The Supervisor(s) should request permission from the Head of Department to restrict audience presence at the exam, at least one week ahead of the exam.

The Student is encouraged to arrive early to prepare for the defence.

At the end and upon successful completion of the defence, and after establishing an agreement on thesis revisions the Supervisor(s) will present the relevant forms for co-signatory by at least one member of the examining committee. Once the form is signed, the document is sent to the Materials Engineering Student office for processing.

Examining Committee & Independent Chair

The exam will be Chaired by an Independent Chair, as designated by the Head of Department.

The supervisor(s) will make recommendations to the Head of Department for the examining committee. This committee will consist of the supervisor(s) and at least two additional Faculty members. All members of the committee shall be members of the Faculty of Graduate and Postdoctoral Studies. In addition to the Supervisor(s), at least one member shall be from Materials Engineering at the rank of Associate or Full Professor. Assistant Professors are encouraged to also act as examiners.

Evaluation Protocol for the Final Oral Defense

This protocol echoes the UBC PhD Examination Protocol.

ORAL EXAM

The examination committee should decide on the candidate's performance while presenting the work (20-25 min presentation), responding to questions, and defending the work.

1. Outstanding performance. No weakness displayed in presentation, response to questions, and defense of the work. Clear and complete understanding of work performed and related engineering principles.
2. Satisfactory performance. No substantive weakness displayed in presentation, response to questions, and defense of the work. Satisfactory understanding of work performed and related engineering principles.
3. Unsatisfactory performance. Major weaknesses in presentation, response to questions, or defense of the work. Poor comprehension of work performed and related engineering principles.

THESIS

1. The thesis is satisfactory, provided suitable revisions are made (if required):
    - No revision or only minor revisions are required. The committee charges the research supervisor to verify that the required changes have been made.
2. Substantive revisions are required. The committee chooses two or more of its members, including the research supervisor, to verify that the required changes have been made.
3. The thesis is unsatisfactory. Major rewriting and rethinking are required.
4. The thesis is unacceptable; it is fundamentally flawed and therefore beyond revision.

OVERALL RECOMMENDATION

The examining committee is then asked to select one of the following overall recommendations:

- Pass. Pending final submission of the thesis, the University should award the degree.
- Re-examination required. The candidate should be allowed a second attempt to pass the Final Oral Masters Examination. (No more than one subsequent attempt is permitted.)
- Fail. The University should not grant the Masters degree to this student.

In cases where the student passes the degree, the Examining Committee may additionally elect to pass the thesis with an Honours classification subject to the following rubric:

"The criterial for 'Honours' will be awarded when a student defends their outstanding thesis with an outstanding performance, e.g. with clear, new, and impactful contribution to the literature; an oral presentation that is suitable for presentation at an international conference, and clarity of thought demonstrated in the discussion during the exam."

Guidelines for Transfer of Graduate Students to a Ph.D. Program Before Completion of the M.A.Sc. or M.Sc. Program

Revised 2024/12/02

Well qualified M.A.Sc. and M.Sc. candidates may apply for transfer to a Ph.D. program after one year residency at UBC and 9 credits of course work (at the 500-level or above) with an overall 85% average and clear evidence of research ability.

In addition to the Faculty of Graduate and Postdoctoral Studies rules on transfer from a Masters to a PhD program as outlined on the UBC Graduate School website, the following program-specific guidance will be followed:

1. The normal procedure will be that an M.A.Sc. or M.Sc. candidate will complete their program before becoming a Ph.D. candidate.
2. Requests for transfer should be submitted to the Department Head by the research supervisor of the graduate student.
3. A student with bachelor degree with one year of study in a master's program with 9 credits of first class average (at the 500-level or above), with overall 85% average and demonstrated evidence of research ability or potential, may be considered for transfer to a Ph.D. program.
4. An Ad Hoc Committee consisting of the Department Head, a Department Graduate Advisor and the research supervisor of the graduate student will consider the transfer and decide whether the transfer will be approved by the Department. The research performance of the candidate must be identifiable and evaluated by the Committee.
5. Transfer into a doctoral program is normally accomplished after the first year of study at the master's level and will not be permitted after completion of the second year.
6. As per the UBC policy, students entering the doctoral program after partial completion of the master's degree must, during the first two years of study at the graduate level, complete a total of 12 credits with a first-class average (of which at least 9 credits must be at the 500-level or above and at least 9 credits must be of first-class standing) to maintain registration as a doctoral student.
7. Once the transfer has been completed, as per UBC policies, the effective start date of the PhD is the same as the original start date of the Masters degree.
8. If a graduate student is transferred to a Ph.D. program, they should complete their PhD comprehensive exam within three months after the transfer.
9. The research proposal should be completed before the end of year 2 of the PhD program.
10. Candidacy should be achieved before the end of year 2 of the PhD program.

Miscellaneous Policy Items - Admissions

In exceptional cases, applicants who hold an honours bachelor's degree with an overall average in the 'A' grade range and who demonstrate advanced research ability may be granted direct admission to a doctoral degree program on recommendation of the admitting Graduate Program and approval of the Dean of the Faculty of Graduate Studies. Students entering directly from a bachelor's degree must, during the first year of study, complete 12 credits with a first class average of which at least 9 credits must be at the 500-level or above and at least 9 credits must be of first class standing, to maintain registration as a doctoral student.