



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

The University of Calgary [Doctoral Candidacy Regulations](#) (“the Regulations”) govern the conduct of admission to doctoral candidacy at the University of Calgary. This document establishes program specific requirements associated with the conduct of admission to graduate candidacy under the *Regulations*.

A. Statement of Purpose

The completion of candidacy in the Mechanical and Manufacturing Engineering Graduate Program will ensure that PhD candidates have the fundamental knowledge and understanding required at the PhD level and the abilities required to complete the thesis research work. These abilities include fundamental knowledge and competence in the areas of research; the ability to communicate technical concepts in both a written and oral medium; and to plan an original and feasible research project. The candidacy process will be completed in not more than 20 months from the student’s commencement in the program.

B. The Doctoral Candidacy Process in the Mechanical and Manufacturing Engineering Graduate Program includes the following components:

1. Successful completion of course requirements.
2. Successful completion of an Oral Field of Studies Exam.
3. Successful completion of a Thesis Proposal document
4. Successful completion of an Oral Proposal Defence.

The typical path and timeline for the candidacy process is outlined in Figure 1. Once the course requirements are completed, the PhD student, normally with advice from the supervisor, selects the order in which to complete the Oral Field of Studies Exam and the Thesis Proposal Document with the Oral Proposal Defence.

**Mechanical and Manufacturing Engineering Graduate Program
Doctoral Candidacy Requirements**

Typical Candidacy Timeline in Mechanical & Manufacturing Engineering

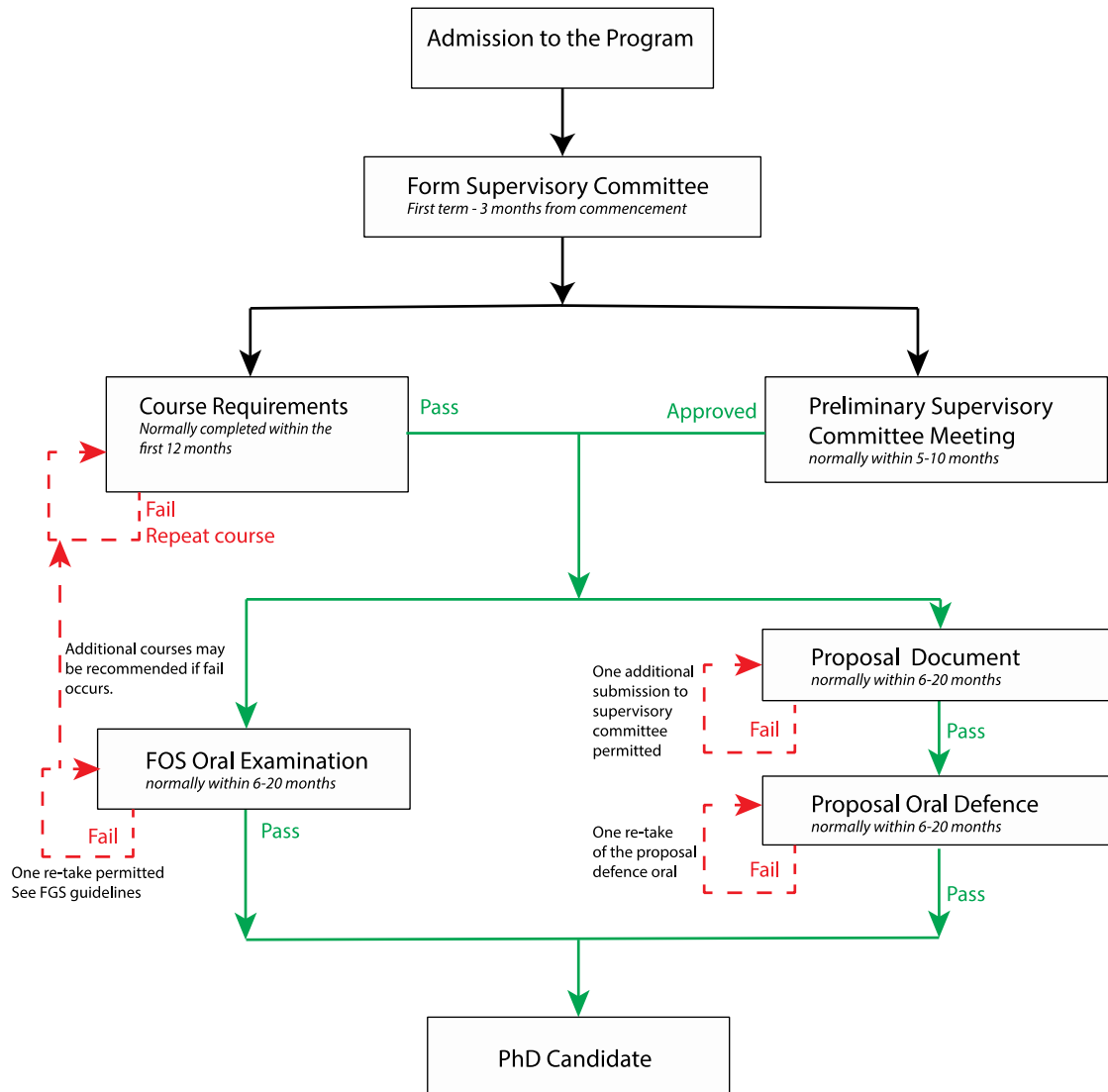


Figure 1. Timeline for the candidacy process.



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

1. Supervisory Committee

The supervisor, in consultation with the PhD student, must form a supervisory committee within three (3) months of appointing a permanent supervisor, as stated in the Faculty of Graduate Studies (FGS) Academic Calendar.

2. Preliminary Supervisory Committee Meeting

The PhD student, supervisor, and additional members of the supervisory committee normally meet within the second term of the students' studies, but not more than 10 months after beginning the students' studies. The purpose of the preliminary meeting is: i) for the student and supervisory committee to have an introductory discussion about the proposed research area, and ii) to determine the "Field of Studies Oral Examination" topics.

The student will prepare a one page document providing a description of the intended research project to be undertaken. The document must be submitted to the supervisory committee at least 1 week prior to the scheduled Preliminary Supervisory Committee Meeting.

The Preliminary Supervisory Committee Meeting will begin with an informal presentation (approximately 10 minutes) in which the PhD student will describe the research project they intend to undertake. Following this, the student and supervisory committee will discuss the project and decide upon the topics (not more than six) that will be examined on the FOS Oral examination. Should fewer than six topics be decided upon, the student will be expected to know each area in greater detail and specificity, the degree to which increases with fewer topics decided upon in the meeting. Conversely, less depth will be required if more topics are specified, up to the maximum of 6 areas.

2.1 Field of Studies Oral Examination Topics Form

The topics for examination will be indicated on a "Field of Studies Oral Examination Topics" form. In addition, suggested textbooks, journal publications and courses will be listed to inform the student of the expected learning level. It is intended that this form be completed within the short preliminary supervisory committee meeting whenever possible. The supervisor is responsible for obtaining signatures on this form from the student and all supervisory committee members and then submitting the form to the graduate program director for approval no later than 2 weeks following the meeting. Any subsequent changes or revisions to the suggested reading materials will need to be listed on this form and approved by the student, supervisor and graduate program director at least 2 months prior to date of the FOS Oral Examination.

2.2 Scheduling of the Preliminary Supervisory Committee Meeting

The Supervisor will schedule the Preliminary Supervisory Committee Meeting in conjunction with the student and additional supervisory committee members. The supervisor will inform the Graduate Studies Office in Mechanical and Manufacturing Engineering of the timing of the meeting.



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

3. Course Requirements

All course requirements must be completed before the FOS Exam or the Thesis Proposal document and Oral Proposal Defence can be commenced (see Figure 1). The program requirements are listed in the Faculty of Graduate Studies (FGS) [Academic Calendar](#). Students may choose to complete courses at any point from admission into the program until the scheduled FOS exam or Thesis Proposal document and Oral Proposal Defence.

4. FOS Oral Examination

The Field of Studies (FOS) Oral Examination can be scheduled following the completion of all course requirements and the Preliminary Supervisory Committee Meeting, normally between 6 months to 20 months after the student's commencement of the PhD program. The FOS Oral Examination can be completed prior to or following completion of the Thesis Proposal Document and Thesis Proposal Oral Defence component of the candidacy process (Figure 1). The FOS Oral Examination committee will consist of the supervisory committee, two additional examiners from outside the supervisory committee who will be approved by the Graduate Program Director, and a neutral chair.

The objective of the FOS exam is to evaluate the students' preparedness in the fundamental concepts that will support their intended research and expected knowledge at the PhD level.

4.1 FOS Exam Format

The Oral Examination is comprised of rounds of questions from the committee to the student. Only members of the examination committee are allowed to question the student. All examiners will be given an opportunity to question the student. Typically, two rounds of questions should be completed within a 2 hour time frame. Examiners are only permitted to ask questions related to the areas identified on the "Field of Studies Oral Examination Topics" form.

4.2 FOS Oral Examination Evaluation

A successful Oral Examination is one where the student is able to demonstrate a mastery of the background and fundamental material that forms the basis of their intended area of expertise. At the end of the exam, the student is asked to withdraw from the room while the committee deliberates on the student's performance on the exam. Before any discussion of the student's performance, each examiner must give their preliminary recommendation of Pass or Fail by secret ballot collected by the neutral chair for the oral exam. This provides the committee a frame of opinion upon which to base a full discussion of the student's performance. The examiners then conduct a post-examination discussion on the student's performance. After the discussion, a final vote will be taken and each examiner must make a recommendation of Pass or Fail on the student's performance. Every attempt should be made to reach a unanimous decision. A unanimous vote for Pass or only one vote for Fail constitutes a Pass for the examination. Two or more votes for Fail constitute a Fail for the examination. The Neutral Chair will inform the student of the committee's recommendation.

Upon a "Fail" of the FOS Oral Examination, the examiners will write brief confidential memos to the Graduate Program Director explaining the reasons for their vote and submit them within five working days from the date of the examination. The neutral chair will write a memo addressed to Graduate



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

Program Director describing the examination procedures. The Graduate Program Director will uphold the recommendation of a fail by the examination committee in the case of a clear fail, or refer to the Faculty of Graduate Studies in the case of an unclear fail recommendation from the committee. If the Graduate Program Director upholds the fail, the graduate program will send a "Notification of Failed Candidacy Component" to the student and keep all correspondence of the student's performance in their file in the Graduate Studies office. All information will be communicated to the student within 10 working days. If the FOS Oral Examination outcome is a fail, the student can have 2 - 6 months to prepare for a second FOS Oral Examination. If the student fails the second FOS Oral Examination, the student will be required to withdraw from the program.

4.3 Scheduling of the FOS Exam

The Graduate Studies Office in Mechanical and Manufacturing Engineering will schedule the exam date in coordination with the supervisory committee, two additional examiners from outside the supervisory committee, and neutral chair. The "Field of Studies Oral Examination Topics" form must be submitted to and approved by the graduate program director prior to scheduling the FOS Oral Examination. Students wishing to take the FOS Oral Examination should inform their supervisor, who will then schedule the examination with the support of the Graduate Studies Office in Mechanical and Manufacturing Engineering. The exam must be scheduled at least one month prior to the planned examination date.

4.4 Appeal of a Failed FOS Exam

If the outcome of any component of the Candidacy Requirements relating to the Thesis Proposal or the Field of Study is a fail, the student has the right to appeal the decision to the Faculty of Graduate Studies. Procedures for appeal are described in the Graduate Calendar under [Academic Regulations](#).

5. Thesis Proposal Document and Thesis Proposal Oral Defence

All students in the PhD program in Mechanical and Manufacturing Engineering must complete a Thesis Proposal Document and a Thesis Proposal Oral Defence following the completion of all course requirements and the Preliminary Supervisory Committee Meeting, normally 6 to 20 months after the student's commencement of the PhD program. The Thesis Proposal Document and Thesis Proposal Oral Defence component of the candidacy process can be completed prior to or following completion of the FOS Oral Examination (Figure 1).

The Thesis Proposal Oral Defence Examination committee will consist of the supervisory committee, two additional examiners from outside the supervisory committee, and a neutral chair.

The Thesis Proposal Oral Defence will simulate a final PhD defence, in preparation for the students' successful completion of the program. Therefore, it will consist of three components:

- a written thesis proposal document
- a 15 minute oral presentation
- an oral examination



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

The Thesis Proposal Document and Thesis Proposal Oral Defense will be evaluated as two components by the Oral Thesis Proposal Defense examination committee. The Thesis Proposal Document will be evaluated by the supervisory committee and returned to the student at least 2 weeks before the scheduled Thesis Proposal Oral Defence with a recommendation of Pass or Fail. The Thesis Proposal Oral Defence can only proceed if the Thesis Proposal Document is unanimously recommended by the supervisory committee to the Graduate Program Director as a Pass. Upon a unanimous recommendation of Fail by the supervisory committee or a lack of unanimity in the outcome recommended to the Graduate Program Director, the student will have 2-6 months to revise their Thesis Proposal Document before re-scheduling the Thesis Proposal Oral Defence. Immediately following the Oral defense, the oral component of the defense will be assessed as a Pass/Fail (see 5.3).

5.1 Written Thesis Proposal Document Format

The objective of the Thesis Proposal Document is to define a research question with an acceptable scope that is an original contribution to the field. The thesis proposal should be constructed such that the contribution and scope of work is easily identifiable by experts in the field. There should also be a comprehensive interpretation of the literature such that both the originality of the work and the scope of the proposed work can be identified. Study objectives and specific aims should be included. Additionally, the document should provide the foundational theoretical and/or experimental framework in which the feasibility of the proposed thesis can be evaluated. Finally, a detailed work plan documenting the study design, methodologies, tasks, analytical approaches and associated milestones the student anticipates are required to complete the program within the 3 years following the completion of candidacy is required. This work plan may be used to assess the student's performance for the annual progress report (APR). On the basis of the student's progress through their program or problems encountered in the proposed research, students will be required to propose amendments/changes to their research objectives and milestones in the APR.

The written proposal should mirror a final thesis document, in terms of formatting, style, and content. The thesis proposal should normally be less than 30 pages of written text and figures/tables (not including the abstract, any index, references, and appendices). The proposal document must be formatted using the style outlined for theses by the Faculty of Graduate Studies in the [Thesis Guidelines](#) document, which specifies the text spacing, font, margins etc. that must be adhered to when preparing the proposal. The proposal document would typically contain the following sections:

- a) Title Page (format specified in the thesis style guide)
- b) Abstract
- c) Introduction
- d) Literature Review
- e) Relevance and Intended Original Contributions
- f) Methodology
- g) Preliminary and/or Expected Results
- h) Timeline for Completion
- i) References



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

The objective of the written proposal is to allow the student to clearly communicate the rationale of his/her research plan to the examination committee before the oral defence. Students are encouraged to communicate with their supervisory committee before the submission of the Thesis Proposal Document to ensure that the document has achieved this goal. The Thesis Proposal Document should be provided to the Thesis Proposal Oral Defence Examination Committee a minimum of 4 weeks in advance of the Thesis Proposal Oral Defence date. Should the student receive a grade of Pass on their thesis proposal document, they should take the corrections and suggestions for improvement seriously when drafting their final Thesis document, required in partial fulfillment of their PhD degree.

5.2 Thesis Proposal Oral Defence Format

The objective of the Thesis Proposal Oral Defence is to provide the student with an opportunity to demonstrate and verbally articulate and defend their proposed original contribution to the field.

The Thesis Proposal Oral Defence will begin with the student giving a 15 minute oral presentation to briefly summarize, and highlight what has been more formally documented in their written Thesis Proposal Document.

The oral defence component is comprised of rounds of questions from the Thesis Proposal Oral Defence examination committee to the student. Only members of the Thesis Proposal Defence examination committee are allowed to question the student. All Thesis Proposal Defence examination committee members will be given an opportunity to question the student. Typically, at least two rounds of questions should be completed within a 2 hour time frame.

Questions should be designed to focus on details and background related to the written thesis research proposal. The objective of the examination is to determine if the student has a sufficiently detailed work plan to accomplish the goals of the research plan in the timeline presented. Further, the questions should be focused on evaluating the scope and feasibility of the proposed research.

A successful Thesis Proposal Oral Defence is one where the student is able to demonstrate and articulate a clear understanding of the research proposal and mastery of the background material that forms the basis of their research.

5.3 Evaluation of the Thesis Proposal Document and Thesis Proposal Oral Defence

At the end of the defence, the student is asked to withdraw from the room while the committee deliberates on the student's performance on the defence. Before any discussion of the student's performance, each examiner must give their preliminary recommendation of Pass or Fail by secret ballot collected by the neutral chair for the oral defence (oral component). This provides the committee a frame of opinion upon which to base a full discussion of the student's performance. The examiners then conduct a post-examination discussion on the student's performance. After the discussion, a final vote will be taken and each examiner must make a recommendation of Pass or Fail on the student's performance. Every attempt should be made to reach a unanimous decision. A unanimous vote for Pass



Mechanical and Manufacturing Engineering Graduate Program Doctoral Candidacy Requirements

or only one vote for Fail constitutes a Pass for the examination. Two or more votes for Fail constitute a Fail for the examination. The Neutral Chair will inform the student of the committee decision.

Upon a “Fail” of the Thesis Proposal Oral Defence, the examiners will write brief confidential memos to the Graduate Program Director and copied to the Dean of Graduate Studies explaining the reasons for their vote and submit them within five working days from the date of the examination. The neutral chair will write a memo addressed to the Graduate Program Director and copied to the Dean of Graduate Studies describing the examination procedures. If the Graduate Program Director upholds the fail, the graduate program will send a “Notification of Failed Candidacy Component” to the student and keep all correspondence of the student’s performance in their file in the Graduate Studies office. All information will be communicated to the student within 10 working days. If the committee recommends that the Thesis Proposal Oral Defence (oral component) is a fail, the student can have up to 6 months to successfully complete a second Thesis Proposal Oral defence. If the student fails the second Thesis Proposal Oral Defence, the student will be required to withdraw from the program.

5.4 Scheduling of the Thesis Proposal Oral Defence

The Thesis Proposal Oral Defence is scheduled after the student has completed all course requirements. The Graduate Studies Office in Mechanical and Manufacturing Engineering will support the supervisor in scheduling the exam in coordination with the supervisory committee, two additional examiners from outside the supervisory committee, and neutral chair.

5.5 Appeal of a Failed Thesis Proposal Document and/or Thesis Proposal Oral Defence

If the outcome of any component of the Candidacy Requirements relating to the Thesis Proposal or the Field of Study is a fail, the student has the right to appeal the decision to the Faculty of Graduate Studies. Procedures for appeal are described in the Graduate Calendar under [*Academic Regulations*](#).

5.6 Extension of Candidacy Time-line

Students who believe they will not be able to complete their candidacy requirements by the end of the 20th month of their program must submit an extension request before the end of the 18th month. All extension requests must include an explanation for the delay and a detailed work plan for the extension time requested. This form must be signed by the student’s supervisor and the Graduate Program Director before being submitted to FGS for approval. Extensions will only be granted under extenuating circumstances and must be supported by the supervisor.

6. Transfer from MSc to PhD

For students who transfer from the MSc program to the PhD program, the candidacy time period requirement will begin the day that the student began the MSc program plus an extra 8 months. Students wishing to transfer from the MSc to the PhD program should discuss how to complete the PhD Candidacy Requirements, as specified in this document, with the Graduate Program Director and their supervisor.