UNIVERSITY OF ALBERTA

DEPARTMENT OF MECHANICAL ENGINEERING

Graduate Study Program Manual

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Chapter 1 – Introduction

The purpose of this manual is to provide students with a statement of the rules and policies for graduate study in the Department of Mechanical Engineering.

This information is meant to supplement the University Calendar which is the primary document describing course and program requirements. This manual is concerned with program, course, and examination requirements that are specific to this department. The Department rules and policy for admission and promotion procedures are somewhat more stringent than those of the FGSR and are fully described below.

For other information students can consult the following:

- Graduate Program Manual of the Faculty of Graduate Studies and Research (FGSR)
- International Centre
- University Teaching Services
- Regulations Governing Graduate Assistantships (FGSR)

The Department of Mechanical Engineering offers two graduate degrees in Mechanical Engineering: MSc, and PhD. Normally, a student wishing to enter a PhD program will have completed an MSc degree first.

This manual contains sections on course and examination requirements and guidelines for Mechanical Engineering programs. Engineering Management programs are described in detail in a separate program manual. This manual also indicates the expected time lines for each student's progress through their program.

Given that the graduate student/supervisor relationship is special, some guidelines for the conduct of supervisors and graduate students are also included below. Graduate students experiencing difficulty in the administration of their program are encouraged to consult with the Associate Chair or the Department Chair. Early resolution of conflicts or misunderstandings is clearly beneficial to all involved. Other sources of assistance are also listed.

Also included in this document are guidelines for the duties of graduate teaching assistants (TAs) and instructors for most courses in the department that utilize TAs. These guidelines are included to help both faculty members and students clarify their roles. A TA who is assigned to a course that is not specifically listed here should consult with the instructor of the course as soon as possible to clarify duties involved.

1.1 Admission, Promotion and Probation

Admission

The minimum Grade Point Average (GPA) required for admission to a graduate program is 3.0 (or equivalent from a recognized University) with a Bachelor's degree in an engineering discipline from a recognized university.

Admission to the graduate program does not guarantee that financial support will be available.

Admission to a doctoral program after a Master's degree is obtained only through application. As a general guideline students must have an above average GPA and a strong written recommendation from their MSc thesis examining committee.

In general, a Master's degree is regarded as a requirement for admission to doctoral studies. However, admission without a Master's degree is sometimes allowed under special circumstances, particularly for scholarship-level students. Students who intend to pursue doctoral studies and have a BSc degree in Mechanical Engineering will normally be enrolled in the MSc program. After one calendar year in the Master's program, a student may be allowed to switch to the PhD program before completing the MSc degree. This decision is not automatic and depends on above-average performance plus a strong recommendation from the student's supervisory committee and the Associate Chair.

Promotion

To continue in the graduate program, the minimum required cumulative GPA on graduate level courses is 3.0 for MSc (Mechanical Engineering) students, and 3.3 for PhD (Mechanical Engineering) students. The cumulative GPA is evaluated at the end of each term. Students falling below this minimum level will be placed on academic probation in the following term, during which they must raise their cumulative GPA above the appropriate minimum level.

Academic Probation

A student who has been placed on academic probation must, by the end of the probationary term, be required to meet the minimum cumulative GPA, as specified in the above section Promotion", by taking the specified course load for a given term in order to clear academic probation. If a satisfactory GPA is not achieved, the Associate Chair and Department Chair may recommend to FGSR whether the student's program should be changed from PhD to MSc or the student should be required to withdraw from the program (the only option for an MSc student)

A PhD student who enters into academic probation after the first term, needs to meet the minimum cumulative GPA by taking 3 graduate courses with the weights of 3 units each (not including THES 90x).

1.2 Registration Procedures and Program Forms

Upon arrival, all new graduate students must take part in a counseling session with the student's supervisor, to establish a suitable program of courses and answer other questions the student may

have. It is the student's responsibility to arrange a meeting with the supervisor to discuss areas of interest and receive guidance on course selection. Students receiving financial support through the Department must be registered as full time, i.e., be registered in at least 3 courses with weights of 3 units each. The student may be asked to provide a justification for not taking a full course load.

Not all graduate courses listed in the Calendar are offered every year. Consult Bear Tracks to obtain a listing of courses offered in each term. Once the supervisor and student have decided on the course selection, the student must register in courses using Bear Tracks, the University of Alberta online registration system www.beartracks.ualberta.ca. It may sometimes be necessary to register manually and/or to obtain permission from other departments to register in their courses. Any deviation from the approved program at a later date must have prior approval of the students' supervisor.

It is the responsibility of each student to ensure that their program satisfies the requirements set out by FGSR and the Department of Mechanical Engineering.

Students can change course registrations without financial penalties before certain cut-off dates set by Registrar's office. For any changes after this date, (specified in the Calendar), students will be billed for at least 50% of the corresponding tuition fees. After this date, students can withdraw from courses without an academic penalty until a specific cut-off date (see the Calendar for the precise date). Withdrawal after that date results in the course being considered a Fail and assigned an academic grade of F (0).

Students who are having difficulty in a course are encouraged to discuss the situation with the instructor. Any course withdrawal form must be signed by the Associate Chair and approved by FGSR.

1.3 Appointment of Supervisor

All full-time MSc students should be associated with a faculty member by the end of the first term (4 months) of starting course work. For doctoral students, the supervisor must be appointed within 8 months and **a complete supervisory committee must be established within one year of the student's arrival in the Department**. It is the joint responsibility of the student and the supervisor to ensure that the supervisory committee is struck in a timely manner.

It is the supervisor's responsibility to notify the office staff when a supervisory arrangement has been made so that the appropriate FGSR forms may be completed. It is a good idea for each student to ensure that the supervisor has complied with this requirement.

For full-time students, if a supervisor has not been officially appointed by the appropriate time, students will be informed in writing and will be required to meet with the Associate Chair to discuss the situation. If a supervisor cannot be found within the Department, the Associate Chair may recommend a change in the degree program and/or withdrawal of any funding arrangements.

Chapter 2 - Course Requirements for Degree

A "graduate course" is one which is listed in the graduate section of the University Calendar.

The Associate Chair should be consulted before registering in any course not specifically listed as a graduate course in Mechanical Engineering. The Department offers introductory graduate courses (Mec E 500-level) as well as specialized graduate courses (Mec E 600- and 700-level). Each graduate degree has a limitation on the number of introductory (Mec E 500-level) courses which may be applied towards the minimum degree course requirement.

2.1 Course Requirements for MSc in Mechanical Engineering

The requirements for the Master of Science (MSc) degree are laid out in the Calendar under section 205.40.2. The candidate must have satisfactorily completed a minimum of 15 units in graduate courses (and also ENGG 600), a research poster, plus a thesis acceptable to the Department of Mechanical Engineering and the Faculty of Graduate Studies and Research. An oral defence of the MSc thesis is required. The structure of the final oral exam is discussed in Appendix A of this manual.

The minimum 15 units in graduate courses is equivalent to five 3-credit, graduate -level courses. Of these five 3-credit, graduate -level courses:

1. At least three must be MEC E course.
2. One must be a course in applied mathematics, numerical analysis, or finite element methods acceptable to the Department of Mechanical Engineering. Three suitable courses are, for example, MEC E 563, CH E 674, and MEC E 690 which are concerned (approximately) with the finite element method, the finite difference method, and analytical methods, respectively. MEC E 630, MEC E 671, MEC E 673, and MEC E 640 are also considered as analytical methods. Other courses, or combination of courses, may be acceptable, with approval of the Associate Chair.
3. Either a maximum of one MEC E 700-level course and one MEC E 500-level course, or a maximum of two MEC E 700-level courses and no MEC E 500-level courses, can be credited.
4. None can be a reading course.
5. No more than two courses (6 credits) used for credit may be taught by candidate's supervisor(s).

Note that all courses must be approved by and additional courses may be required by the Thesis Supervisor. The student should confirm with their supervisor that the Approval of Supervisor form has been prepared and sent to the FGSR as soon as possible in their program.

Alteration to these required courses is at the discretion of the Chair and the Associate Chair (Graduate Studies) upon written request from the supervisor.

2.2 Course Requirements for PhD in Mechanical Engineering

The general requirements for the Doctor of Philosophy (PhD) degree in mechanical engineering are laid out in section 205.40.6 of the University Calendar. The candidate must have completed a minimum of five single-term (3-credit) graduate-level courses after a Master's degree plus an acceptable thesis based on the candidate's research. An oral candidacy examination and an oral defence of the PhD thesis are also required. (See Section 3.3 below). The candidacy and final oral exams are discussed later in this manual, (Section 3.3, Appendix A and Appendix C). For student who has obtained an MSc in Mechanical Engineering from the University of Alberta can take a minimum of three single-term (3 credit) graduate-level courses. The rest of the requirements remain the same as listed above.

The details of the courses required are decided in consultation with the candidate's supervisor and/or supervisory committee. Departmental requirements are as follows:
Of the five required graduate -level courses:

1. The majority must be Mec E courses.

2. One MUST be Mec E 680 (Continuum Mechanics).

3. A maximum of one course can be at the MEC E 700-level but NONE can be at the Mec E 500-level.

4. NONE can be a reading course.

A student's supervisory committee may require additional courses beyond the minimum of five. Note that all courses must be approved by the Graduate Coordinator. (The course requirement for a student proceeding directly from a Bachelor's degree is the combined requirements for both MSc and PhD degrees, that is, a minimum of 10 courses, including one acceptable course on mathematical topics and MEC E 680, with either a maximum of two MEC E 700-level and one MEC E 500-level courses, or a maximum of three MEC E 700-level and no MEC E-500 level courses and no reading courses. At least six of the required minimum 10 courses must be Mec E courses). **Alteration to these required courses is at the discretion of the Chair and the Associate Chair (Graduate Studies) upon written request from the supervisory committee.**

2.3 Courses Offered, Course Revisions and New Courses

The graduate courses offered by the Department are listed in section 231.186 of the University Calendar. Not all of these courses are offered in a given year; however, a list of the courses offered during a particular academic year will be available approximately two months before the start of the term.

2.4 Minimum GPA Requirement

Regardless of the student's category, while registered in the Faculty of Graduate Studies and Research the pass mark in any course taken is a grade of C+.

All students in graduate degree programs (including time spent as a qualifying graduate student) must maintain a minimum cumulative grade point average of 3.0 (MSc students) or 3.3 (PhD students) throughout their program. Students failing to maintain their GPA will be placed on academic probation in the following term (see section 1.1 above).

2.5 Full Time vs Part Time Enrolment

Effective September 2003, students who are admitted to any thesis-based program and who initially register full-time must register full-time for the remainder of their program.

Students with full-time status will have increased access to scholarships, bursaries, student loans, and travel funds; student loans will be considered as having interest-free status until the program is completed. Full-time status provides tax advantages in the form of an increase in the student's education amount. The GSA Dental Plan covers only those students registered as full-time on-campus students.

Incoming graduate students who intend to be part-time throughout their program register as part-time in their first semester. The department and supervisor must be informed of this well in advance of the first term of registration.

The University defines "Full Time" as enrolment with a total of 9 units of course weight. A typical course has a weight of 3 units. Any total number of units less than 9 units per term defines the student as "Part Time". Note that course weights are not the same as fee index units. See Section 2.11 THES 90X Courses for information on using THES 90X courses to maintain full time enrolment. Students who have completed their course work and are working on their thesis research the majority of the time and meeting regularly with their supervisor should be registered full time. In addition, full-time registration is usually required if you hold a scholarship or a visa.

Part-time registration is usually reserved for those students who cannot spend the majority of their time on thesis research due to job commitments or some other exceptional circumstances. It is generally not department policy to provide funding as a TA or RA for part-time students. Nor do supervisors normally provide funding for part-time students. In addition, Canada Revenue will not allow you to claim the monthly education deduction if you are not registered full time.

It is the student's responsibility to comply with the terms of any scholarship or other contract. Failure to do so may be a breach of the Code of Student Behaviour, which has serious consequences.

2.6 Residency Requirement

The residency requirements for each degree program are outlined in the University Calendar under Section 203.6

MSc 2 terms of full-time registration

PhD 4 terms of full-time registration (after an MSc degree)

For programs with a residency requirement, this is satisfied by full-time enrolment for the period specified.

2.7 Continuous Enrolment

All students must register in some manner each term. Failure to register in any academic year will be interpreted by FGSR as a withdrawal and the student will have to apply for re-admission and pay an FGSR readmission fee. FGSR has a Continuous Registration fee that will allow registered students to maintain their student privileges when not taking any other courses.

2.8 THES 90x Courses

Some students in thesis-based programs (MSc or PhD) will take fewer than three courses per term but need to be categorized as full-time. Students can register in a course called THES 90x where x = 3, 4, 5 … 9 is the weighting unit.

FGSR also requires a minimum amount of THES registration. Students must be registered in THES 90x for the term in which they submit their thesis. Also, all Master's programs require a minimum of 24 units in course plus THES 90x weight. Hence, a student taking 5 courses (15 units) would require 9 units of THES 90x registration.

2.9 Transfer and Advanced Credit

Requests for transfer and/or advanced credit must be approved by FGSR. For thesis-based programs, a maximum of two courses (6 course weights) may be applied to a program.

Chapter 3 - Examination Requirements

3.1 Master of Science

An oral defence of the thesis is a program requirement. The purpose is to ensure that:

- the thesis research is of high quality,
- the student carried out the work,
- the student understands and can interpret the results, and
- the thesis is written in a clear and concise manner.

The procedure followed for the MSc oral examination is outlined in Appendix A.

3.3 Doctoral Students

Students are admitted to the doctoral program based on the assumption that they hold a Master's degree, or equivalent, from an approved University. In addition to the required course work described above, all doctoral students must pass an oral candidacy examination and a final thesis defence. Full details of the procedures followed in each of the above examinations are given in Appendices B and C, respectively. Briefly, the main features of these exams are as follows:

(a) The candidacy exam will normally be scheduled between eighteen (18) and twenty-four (24) months after the student enters the doctoral program. It should occur after completion of the bulk of the student's course work and some progress has been made on the topic of research. This oral exam is intended to ensure that the student has adequate preparation to proceed with the thesis research. For details on this exam see Appendix B.

Once the candidacy exam is passed, the department will send a notice to the FGSR indicating successful completion of the candidacy. This comment will be reflected on the student's transcript. The candidacy exam is an important milestone in a student's program. Failure to hold the exam within the time frame given above will result in action by the Associate Chair and/or Department Chair.

(b) The oral defence of a PhD thesis is held according to the procedure outlined in the Faculty of Graduate Studies and Research section of the Calendar, sections 203.12 and 204.2. Further details are given in Appendix C.

Chapter 4 - Other Requirements

Ethics and academic integrity training is mandatory for all newly-admitted U of A graduate students who started their program on or after September 1, 2004.

Each student is required to successfully complete the University-wide WebCT course and ENGG 600. MSc students must complete these courses before submitting thesis and PhD students before taking the candidacy exam,

4.1 Academic Integrity and Ethics Training

1. University wide e-class GET course
   The course covers the following topics: conflict of interest, graduate student-faculty relationships, intellectual property and credit, conflict resolution, and integrity and scholarship. Students will receive certification of 5 credit hours upon completion of the entire session.
2. Registration in ENGG 600 – Engineering Ethics and Integrity
   This course will be scheduled for winter terms. Graduate students should register for this on Bear Tracks.

In exceptional circumstances, such as full-time employment, a student may have difficulty attending the lectures of ENGG 600. The Associate Chair must approve any special arrangements in advance.

4.2 Wall Poster

It is a department requirement for MSc and PhD students to prepare and present a wall poster on their thesis research before their oral defence.

Instructions on the steps to be followed in creating a research poster in the desired format can be found on the department web site under the link to Graduate Studies in Mechanical Engineering A copy of this wall poster will remain in the Department of Mechanical Engineering for display. Students must provide the Senior Graduate Program Assistant with an electronic copy of their poster. It is the responsibility of the student to ensure that the poster is completed and submitted to the supervisor for display.

4.3 TA Orientation Classes

Effective September 2006, all students accepting a teaching assistantship from the Department of Mechanical Engineering must complete department approved Teaching Assistantship Orientation classes. Beginning September 2010 this training is included in the Department New Graduate Orientation. In addition the FGSR is hosting a series of teaching sessions for graduate students being held in early September. We recommend that you register for as many of these sessions as you can. Failure to attend the orientation and TA classes may result in the teaching assistantship being given to another student.

Chapter 5 - Guidelines for Supervisors and Graduate Students

5.1 Supervisors

The primary task of a supervisor is to provide an environment for the student that is conducive to research and in which the student can grow intellectually. This includes the following;

a) Provide appropriate guidance to the student on the nature of research and the standard expected, and be accessible to give advice and constructive criticism. At the beginning of the supervisory relationship, the student should be made aware of the normal expectations held by the supervisor and the Department.

b) With the student establish a realistic timetable for completion of various phases of the program.

c) Consider a graduate student as a "junior colleague in research."

d) Ensure that there are sufficient material and supervisory resources for each graduate student under supervision.

e) For doctoral students, work with the student to establish the supervisory committee within one year after the start of the program and ensure that it maintains contact and formally meets with the student at least once a year.

f) When going on leave or an extended period of absence, ensure that the student is adequately supervised by the provision of an acting supervisor (who should be a member of the supervisory committee).

g) Ensure that the student is aware of his/her guidelines (as listed below) and, when necessary, assist the student in meeting these.

h) Set up committee meetings and examinations after consultation with the student. Students must be given sufficient advance notice of oral examinations (minimum 4 weeks).

i) It is the responsibility of the Department Chair or Graduate Coordinator to nominate an external examiner, after consultation with the supervisor or the supervisory committee, and submit it to FGSR for approval two months before the final exam is scheduled.

   The external examiner should not be contacting the supervisor directly regarding the thesis or making arrangements related to the examination.

   The proposed external examiner must be in a position to review the thesis objectively and to provide a critical analysis of the work and the presentation. It is therefore essential that

the external examiner not have a current or previous association with the student, the supervisor, or the department which would hinder this type of objective analysis. For example, a proposed examiner who has recently been associated with the student as a research collaborator or co-author would not be eligible. A proposed external examiner must not have had recent association with the doctoral candidate's supervisor (as a former student, supervisor, or close collaborator, for instance.) A proposed external examiner should not normally be nominated more frequently than once every two years. External examiners are nominated by the Department and approved and invited by FGSR. Supervisors who are in doubt about the eligibility of a potential external examiner are urged to call the Associate Dean in the FGSR to review the case before the nomination is submitted to FGSR.

5.2 Graduate Students

All graduate students should make themselves aware of the contents of the graduate portions of the University Calendar. Graduate students take full responsibility for their own programs (course and program requirements, meeting program milestones, etc.) In addition, graduate students should:

a) Submit the Graduate Student Activity Report for each academic term. This is a compulsory requirement for students starting from the second term into the program.

b) Maintain open communication with their supervisor and Graduate Coordinator concerning any problem either real or perceived.

c) inform the supervisor regularly about progress. PhD students must provide the supervisor with semi-annual reports for distribution to the supervisory committee (one of these should be just before the committee meeting arranged by the supervisor).

d) Make research results accessible (beyond their appearance in a thesis) to an appropriate audience.

e) Be aware of deadlines for possible scholarship applications, and to seek advice and assistance from the Department in making applications, etc.

f) All department keys must be returned upon completion of the degree.

5.3 Thesis Requirements

a) Arrangements and expenses for thesis preparation, including typing, production of photographs and tables, and duplicating are the responsibility of the student. Instructions regarding thesis format and methods of thesis reproduction are found on the FGSR

website at the following link:
http://www.gradstudies.ualberta.ca/degreesuperv/thesis/prepare.htm.

b) It is the responsibility of the student to follow the requirements of the FGSR for the preparation and submission of your thesis. These requirements are found on the FGSR website under Degree Requirements and Supervision, Thesis Requirements.
http://www.gradstudies.ualberta.ca/degreesuperv/thesis/prepare.htm

Chapter 6 - The Utilization of Graduate Teaching Assistants (TAs)

6.1 Policy on TA Assignments

6.1.1 The Function of a Graduate Teaching Assistant

The function of a Graduate Teaching Assistant (TA) is to provide assistance for faculty in the teaching function in a way that makes a significant contribution to the faculty member's teaching efforts and that makes an optimum contribution to the education of the student.

To accomplish this purpose the TA should be given the maximum amount of authority and responsibility that can be associated with their duties. Due to the number of available positions and the duties required within the Department, of necessity some TAs will basically function as markers in some courses. However, in many courses an arrangement between the TA and the individual instructor is worked out whereby the TA accepts responsibility for certain functions such as such as proctoring, marking, laboratory supervision, and occasional lecturing. Other duties may be assigned with the agreement of the instructor, the department chair or graduate officer, and the graduate student. Guidelines related to marking of final examination are provided in Section 23.5.3 of University Regulations.

6.1.2 Basis for Assigning Graduate Teaching Assistants

Graduate teaching assistantships are assigned by the department Chair (or designate) in the following manner:

a) Each term the number of assistantships is decided based on teaching requirements and departmental resources.

b) Students in their first term of graduate studies will not be provided with TA support; except for PhD students who have already did MSc in Mechanical Engineering from the University of Alberta.

c) TA allotment will be strongly dictated by the matrices identified in the Graduate Activity Report. Preference is given to experienced TAs who have received a favorable evaluation in previous terms.

d) Where possible, TAs with experience as well as new TAs should be assigned to each lab.

e) TA assignments are made on a term-by-term basis. Inadequate performance in a term may result in the loss of an assignment for subsequent term(s).

6.2 The Responsibilities of the Graduate Teaching Assistant

6.2.1 Marking

Teaching Assistants may be required to assist with marking assignments, short quizzes, grading laboratory reports, proctoring exams and compiling grade statistics. Guidelines related to marking of final examination are provided in Section 23.5.3 of University Regulations. It is expected that TAs will adhere to the University Regulations.

Chapter 7 - Financial Support

7.1 Sources

The Department endeavors to provide financial support to as many graduate students as possible. Sources of funding available to the Department include:

a) Graduate Teaching Assistantships
b) Graduate Research Assistantships from research grants and contracts held by individual faculty members.

The Department has a limited number of Teaching and Research Assistantships.. Decisions of financial support from the Department cannot be made until budgets for the coming academic year are finalized. This is normally at the end of April or in early May of each year.

Assistantships from grants and contracts held by individual faculty members are obtained through application to the faculty member. Most faculty members support students whom they are supervising through their research funds.

The rate of remuneration for assistantships is similar from all sources. The Graduate Students' Association negotiates the pay scale for university sponsored teaching and research assistantships. Individual faculties and faculty members attempt to follow these rates, but at times limited grant and contract monies can result in lower compensation. The Department of Mechanical Engineering has guidelines for minimum levels of compensation for domestic and international students.

Other sources of funding include:

a) Research Travel Support (FGSR); and
b) Scholarships (Administrated by the FGSR and the Faculty of Engineering)

The scholarships and assistance available to graduate students are listed in the Awards section of the Calendar. Also consult FGSR application for general awards (available from the Senior Graduate Program Assistant). Students are responsible for preparing applications for funding from these sources. Note that there are usually separate departmental and FGSR deadlines for receipt of applications.

7.2 Time Limits for Funding and Length of Program

7.2.1 Funding

Funding is normally available only to full-time students registered in thesis-based programs.

At the Master's level, the Department limits the total time over which a student can expect to receive financial support from sources (a), (b) mentioned above. For an MSc student the funding

time limit is 20 months following entry to the program. This time may be extended by up to 4 months upon application to the Department Chair. Note that the time is measured from when the student begins the Master's program, not from when they begin to receive any financial support.

For PhD students, the limit for sources (a) and (b) is 3 years from the time a student begins a PhD program.

7.2.2 Length of Program

The FGSR sets time limits on the overall length of thesis-based Master's and Doctoral programs. These are 4 and 6 years, respectively, measured from when the student is first admitted to the program. In the special case of a Master's student who is reclassified as a provisional doctoral candidate, all degree requirements must be fulfilled within 6 years from when they first registered in the Master's program.

Requests for program extensions must be strongly justified and approved by FGSR.

Appendix A - Oral Examination Procedures (MSc)

The make-up of the Examination Committee consists of the following:

- Minimum of three faculty members
- Normally all members are full-time faculty
- At least one from outside the department
- All members must attend the examination
- Must be chaired by a faculty member from inside the department

The basic element is to have a minimum of three members. Roles of members can be in any combination. For example, co-supervisors, a co-supervisor who is also the internal-external, supervisor from outside the department. For complete details on examinations please refer to the FGSR website: http://www.gradstudies.ualberta.ca/examsconvo/mtexams.htm

Notes:

1. The 'presentation component' of the oral examination is open to the university community. The examination committee chair is the moderator.
2. For MSc students, the thesis supervisor(s) and chair of the oral examination committee are NOT the same person.
3. The FGSR must receive the MSc Examination Notice at least three weeks in advance of the exam date
4. The examiners must be provided a copy of the thesis at least three weeks in advance of the exam date.

TIME	**ACTION BY EXAMINATION COMMITTEE CHAIR**
When the supervisor requests the oral examination	Go over the candidate's academic record and ensure that the degree requirements have been met.
Immediately after publication of the Notice of Oral exam (at least 3 weeks for MSc)	Check that the room is booked and that appropriate notices have been distributed to announce the (open) seminar component of the examination to the university community. See the supervisor(s) and ask him/her to prepare a summary of the candidate's academic record for the oral. Make sure the supervisor has the file.
1 week before the exam	Arrange to see the candidate and explain the procedures to be followed. The candidate is expected to present a summary of his/her work (20 - 25 minutes). The presentation should outline the problem investigated, the methods

	used and the results obtained. Remember that the committee has read the thesis and that the purpose of the presentation is for the committee and general audience to hear the student's interpretation of his/her achievements and to give the student the opportunity to present his/her research and become more at ease in the room.
On the day of the examination, in the examination room	Chair acts as moderator. Begin the presentation promptly (you may wish to post a notice: 'exam in progress - do not enter' on the closed door once the presentation begins. This will avoid interruption). Welcome the audience, introduce the candidate and ask the candidate to go ahead with a 20-25 minute presentation. Do not allow questions from audience during the presentation. However members of the examining committee may be permitted to ask short questions only, for clarity, during the presentation. Once the presentation is complete invite questions from the audience (5-10 minutes. Following this question and answer session, adjourn the presentation and ask the non-committee members to leave.
Following the presentation, in the examination room (committee members only)	Introduce everyone, if necessary, and welcome them. State purpose of meeting. Summarize these procedures for the benefit of everyone. Ask candidate to leave.
Next 5-10 minutes .	Ask the supervisor(s) to summarize the student's academic record pertaining to the degree being sought so that the committee members are assured that the course requirements have been met Ask candidate to return.
Time variable	Question time – normally two rounds of questions. Round one: (Explain to members of the committee that they must await their turn - the

	candidate and the questioner should not be disturbed by interruptions), approx. 10 min. each. Start with external examiners, then go to departmental examiners, then supervisor(s) last. (Chair prompts, if necessary, if an area hasn't been covered.)
	Round two: if necessary, same order.
5 minutes	Ask the candidate if he/she wishes to say anything else.

DECISION

1. Ask the candidate to leave. In the candidate's absence, ask each member of the committee:

    a. Is the candidate's general knowledge in the field of thesis sufficient for the awarding of the degree? If reservations are expressed, determine a suitable procedure for the candidate to meet this requirement.

    b. Is the thesis:
        i. Acceptable as is?
        ii. Acceptable with revisions?
        iii. Not acceptable?
        Which will necessitate a rewrite using better information on the topic, or a new topic?

    One of the following outcomes of the final oral examination is then appropriate:
    - Pass
    - Pass subject to revisions
    - Adjourned
    - Fail

Note: There is no provision for a final oral examination to be "passed subject to major revisions" -FGSR Graduate Program Manual, Section 8.

"Normally, if all but one member of the committee agrees on a decision, the decision shall be that of the majority. If two or more dissenting votes are recorded, the department will refer the matter to the Associate Dean, FGSR, who will determine an appropriate course of action."
-FGSR Graduate Program Manual, Section 8.

If it is known that the candidate may be interested in pursuing a doctoral degree, the committee should discuss the student's potential and make a written recommendation to the Associate Chair via the student's supervisor.

2. Re-admit candidate and explain the decision of the committee regarding the thesis.

Normally, the supervisor should locate the student waiting outside the examination room and quickly tell them the verdict. In the event of an unsatisfactory outcome, some tact will be required here. The Chair of the examining committee can briefly outline the committee's decision. Further details and amplification should probably be left to the supervisor. Modifications to the thesis which are typographical in nature should be given to the candidate for incorporation into the thesis.

Candidate will bring Thesis Approval/Program Completion form to the examination. Part 2 will be completed by examining committee at the end of the in camera discussion. Supervisor(s) normally withhold their signature(s) pending completion of minor corrections at the discretion of the committee.

Thank everyone and close the exam.

After all examiners and supervisor(s) have signed, Part 3 will be completed by the Associate Chair, Graduate. One copy of the form will be kept for Department file and original sent to the FGSR.

COMMENTS:

1. Most orals take at least two hours. Make sure room booking time is adequate.
2. Make sure the candidate knows that the supervisor(s) probably would not have called the oral if the candidate was not ready.
3. Let the candidate use what audio-visual aids are necessary to him/her. The candidate probably knows best because it is his/her work (or should be!).
4. Try to foster an atmosphere of relaxed confidence.
5. Let the student answer the questions!

Appendix B - Candidacy Examination (PhD students only)

The Candidacy examination should be taken as early as possible in the student's program. At this time, most course work should be completed and the student should have spent several months performing literature search, defining the research topic, etc. The exam should be between 18 and 24 months after the student first starts the program. FGSR requires that the exam be held not less than six months prior to taking the final oral examination. Once the candidacy exam is passed, the department sends a notice to the FGSR indicating successful completion of the candidacy. The date will be reflected on the student's transcript.

The purpose of the candidacy examination is to assess the student's knowledge "of the discipline and of the subject matter relevant to the thesis" and the student's "ability to pursue and complete original research at an advanced level". The department has historically taken a broad view as to what constitutes the "discipline." Students can be expected to answer questions on a broad range of topics within the scope of mechanical engineering. Students should discuss this with their supervisor well before the exam is to be taken in order to be well prepared.

During the candidacy examination, only minimal attention should be given to the work done on the thesis. However, the student is required to give a 20 - 25 minute presentation on the proposed research topic. This presentation will be open to the university community. In addition, the student must prepare a one-page typed summary of his/her research topic to be given to all committee members at least one week before the examination. The student should also inquire as to the general nature of the questions to be expected from the committee members. The first round of questions will be concerned with general topics and will test the student's general knowledge of the discipline. The second and subsequent rounds of questioning will be concerned with topics related to the candidate's area of research and his/her ability to carry the research through to completion. At this stage the supervisory committee should ask questions that test the viability of the thesis proposal.

Examining Committee Structure

The examining committee consists of the following composition:

- The supervisory committee and normally the addition of two other faculty members
- Normally all members are full-time faculty
- At least one must be from outside the department
- Must have a minimum of two arm's length members at the examination who come new to the examination
- Must be chaired by a faculty member who is not the supervisor (or co-supervisor) but is a member of the student's home department. If the chair is not a member of the examining committee (FGSR encourages this arrangement) the chair does not vote.
- All members must attend the exam

The basic element is to have a minimum of five members. Roles of members (except the chair) can be in any combination. For example, co-supervisors, a co-supervisor from outside the

department, supervisor from outside the department, arm's length member from inside or outside the department, etc. For complete details on examinations, please refer to the FGSR website: http://www.gradstudies.ualberta.ca/examsconvo/docexams.htm

The Chair may participate in the questioning, but does NOT vote on the final decision. The Chair is responsible for the conduct of the exam and moderating the presentation and the discussion. See the FGSR Graduate Program Manual Section 8: Supervision, Oral Examinations, and Program Completion.

TIME	**ACTION BY EXAMINATION COMMITTEE CHAIR**
When the supervisor requests the oral examination	Go over the student's academic record and ensure that they have completed most, if not all, of the formal course requirements.
Immediately after publication of the Notice of Oral exam (at least 3 weeks prior to the examination)	Check that the room is booked and that appropriate notices have been distributed to announce the (open) seminar component of the examination to the university community. See the supervisor(s) and ask him/her to prepare a summary of the candidate's academic record for the oral. Make sure the supervisor(s) has the file.
About 1 week before the exam	Arrange to see the candidate and explain the procedures to be followed. The candidate is expected to present a summary of his/her work (20-25 minutes), completed and proposed. This will give the student a chance to become accustomed to addressing the committee and provide a starting point for questioning. Make sure the candidate is well-prepared
On the day of the examination, in the examination room	Chair acts as moderator. Begin the presentation promptly (you may wish to post a notice: 'exam in progress - do not enter' on the closed door once the presentation begins. This will avoid interruption). Welcome the audience, introduce the candidate and ask the candidate to go ahead with a 20- 5 minute presentation. Do not allow questions from the audience during the presentation. However, members of the examination committee may be permitted to ask short questions only, for clarity, during the presentation. Once the presentation is

	complete, invite questions from the audience (5 - 10 minutes). Following this question and answer session, adjourn the presentation and ask the non-committee members to leave.
Following the presentation, in the examination room (committee members only) (first 5 minutes) First five minutes	Introduce everyone, if necessary, and welcome them. State purpose of meeting. Summarize these procedures for the benefit of everyone. Ask student to leave.
Next 5-10 minutes	Ask the supervisor(s) to summarize the student's academic record pertaining to the degree being sought so that the committee members are assured that the course and other examination requirements have been met. Ask student to return.
Oral Questioning	Round one: (Explain to members of the committee that they must await their turn - the candidate and the questioner should not be disturbed by interruptions), approx. 10 min. each. Start with external examiners, then go to departmental examiners, then supervisor(s) last. The Chair may prompt, if necessary, if an area hasn't been covered. Round two: repeat same order. Round three: if necessary, same order.
5 minutes	Ask student if he/she wishes to say anything else.

DECISION

1) Ask the student to leave.

2) Ask the examining committee:
   i) If the student possesses and adequate knowledge of the discipline and of the subject matter relevant to the thesis.
   ii) If the student has the ability to pursue and complete the original research at an advanced level.

"Normally, if all but one member of the committee agrees on a decision, the decision shall be that of the majority. If two or more dissenting votes are recorded, the department will refer the matter to the Associate Dean, FGSR, who will determine an appropriate course of action."

-FGSR Graduate Program Manual

2.2 Outline any deficiencies and determine whether they are:

(a) None or Minor. (Decision: Pass)
(b) Significant. (Decision: Conditional Pass)

Note the deficiencies and plan for a written description of the course of action required for the student to clear the deficiencies with the supervisory committee's guidance.

If the candidacy examination committee agrees to a conditional pass for the candidate, the Chair of the examination committee shall provide in writing to the Vice-Dean, FGSR and the student.

- The reasons for this recommendation
- Details of the conditions
- Time frame for the student to meet the conditions
- The approval mechanism for meeting the conditions, i.e., approval of the committee Chair, or approval of the entire committee, or select members of the committee
- The supervision and assistance the student can be expected to receive from committee members.

(c) Cause for failure (Decision: Fail)

Note the deficiencies and discuss the Department's recommendation for the student's program. The following options are to be considered:

i) Repeat the Candidacy

If the student's candidacy exam performance was inadequate but the student's performance and work completed to date indicate that the student has the potential to perform at the doctoral level, the Examining Committee should consider the possibility of recommending that the student be given an opportunity to repeat the candidacy exam.

ii) Change of Category to a Master's Program

If the student's candidacy exam performance was inadequate and the student's performance and work completed to date indicates that the student has the potential to complete a Master's program, the Examining Committee should consider the possibility of recommending a Change of Category to a Master's Program

iii) Termination of the Doctoral Program

If the student's performance was inadequate and the work completed during the program is considered inadequate, the Examining Committee should recommend termination of the student's program.

3. The supervisor should re-admit the student and quickly explain the decision of the committee (pass or fail). In the event of an unfavorable decision, some tact will be required. The supervisor may wish to quickly outline the decision before the student is readmitted to the examination room.

4. 4.1 In the event of a pass decision:
Discuss the possible avenues of research to pursue.
Outline possible deficiencies and the recommended action to clear those deficiencies. Further courses and/or reading matter may be suggested. If the deficiencies are judged significant, ensure that the supervisory committee and student agree on the mechanism for determining that the student clears the deficiencies.

4.2 In the event of a fail decision:
Discuss the Departmental recommendation for the student's program. If the recommendation is to repeat the candidacy, explain the procedure discussed previously in the footnote to that option. Further courses and/or reading matter may be suggested. This latter task might be left to the supervisor and/or supervisory committee.

Thank everyone and close the exam.

If successful, inform the department Graduate Assistant and the Report of Completion of Candidacy Examination will be completed and signatures obtained.

If the candidate was successful in the examination, the Department will forward to FGSR a notice indicating successful completion of the candidacy. The date will be reflected on the student's transcript. If there were significant deficiencies send a memo to FGSR (copy to the student) outlining the steps to be taken, (per 4.1 above); the Department will hold the form until the supervisory committee/Associate Chair notifies FGSR that the candidate has overcome the deficiencies.

If the student is not successful in the examination, the department will inform FGSR in writing (copy to the student) of the outcome and the recommendations for the student's program.

COMMENTS:

1. Most orals take at least two hours. Make sure room booking time is adequate.
2. Make sure the student knows that the supervisor probably would not have called the oral if he/she does not think the student is ready.
3. Let the student use what audio-visual aids are necessary to him/her. The student probably knows best because it is his/her work (or should be!).
4. Have fun. Try to foster an atmosphere of relaxed confidence.

5. Let the student answer the questions!

Appendix C - Final Examination (PhD)

The make-up of the PhD Final Examination Committee is as follows:

- The supervisory committee and normally the addition of two other faculty members
- Normally all members are full-time faculty
- At least one University of Alberta member must be from outside the department
- One member must be an external examiner/reader from outside the University
- In addition to the external must have a minimum of one additional arm's length member at the examination who comes new to the examination (but may have served on the candidacy examining committee)
- Must be chaired by a faculty member who is not the supervisor but is a member of the student's home department. If the chair is not a member of the examining committee (FGSR encourages this arrangement, the chair does not vote).

Must have a minimum of five members in attendance at the exam. If a reader is used, still need five members present at the examination. However, if teleconferencing is used for the external then only a minimum of four other members need to be appointed since there is active participation by the external. The basic element is to have a minimum of five members present. Roles of members can be in almost any combination. For example, co-supervisors, a co-supervisor from outside the department, supervisor from outside the department, arm's length member from inside or outside department, etc.

For complete details, please refer to the FGSR website:
http://www.gradstudies.ualberta.ca/examsconvo/docexams.htm

Notes:
1. The 'presentation component' of the oral examination is open to the university community. The examination committee chair is the moderator.
2. For PhD students, the thesis supervisor(s) and chair of the oral examination committee are NOT the same person.

It is the responsibility of the Department Chair or Associate Chair to nominate an external examiner and submit the name to FGSR for approval. This important step must be initiated at least 3 months in advance of the proposed defence date. The external examiner should not be contacting the supervisor or student directly regarding the thesis or making arrangements related to the examination.

The external examiner shall receive the thesis from the department at least four weeks before the examination.

TIME	**ACTION BY EXAMINATION COMMITTEE CHAIR**
When the supervisor requests the oral examination notice	Go over the candidate's academic record and ensure that the course requirements have been

	met. Check that the supervisor(s) has received approval for the External Examiner from the FGSR.
Immediately after publication of the Notice of Oral exam (at least 3 weeks prior to the PhD Exam)	Check that the room is booked and that appropriate notices have been distributed to announce the (open) seminar component of the examination to the university community. See the supervisor(s) and ask him/her to prepare a summary of the candidate's academic record for the oral. Make sure the supervisor has the file.
About 1 week before the exam	Arrange to see the candidate and explain the procedures to be followed. The student should meet with committee members (but NOT the external examiner) before the defence to see if there are any particular areas of concern. The candidate should be prepared to present a summary of his/her work (maximum 30 minutes). The presentation should outline the problem investigated, the methods used and the results obtained. Remember that the committee has read the thesis and that the purpose of the summary is for the general audience and the committee to hear the student's interpretation of his/her achievements and also to give the student a chance to talk and become more at ease in the room.
On the day of the examination, in the examination room	Chair acts as moderator. Begin the presentation promptly (you may wish to post a notice: 'exam in progress - do not enter' on the closed door once the presentation begins. This will avoid interruption). Welcome the audience, introduce the candidate and ask the candidate to go ahead with a 25-30 minute presentation. Provide a 5 minute warning at 25 minutes, if necessary. Do not allow questions from the audience during the presentation. However, members of the examination committee may be permitted to ask short questions only, for clarity, during the

	presentation. Once the presentation is complete, invite questions from the audience (5 - 10 minutes). Following this question and answer session, adjourn the presentation and ask the non-committee members to leave.
Following the presentation, in the examination room (committee members only) (first 5 minutes) Next 5-10 minutes	Introduce everyone, if necessary, and welcome them. State purpose of meeting. Summarize these procedures for the benefit of everyone. Ask candidate to leave. Ask the supervisor(s) to summarize the candidate's academic record pertaining to the degree being sought so that the committee members are assured that the course and other examination requirements have been met.
	Ask student to return.
Time variable	Question time - 2 or 3 rounds of questions
Round One	Explain to members of the committee that they must await their turn - the candidate and the questioner should not be disturbed by interruptions. Examiners have approximately 15 minutes each. Start with external examiners, then go to departmental examiners, then supervisor(s) last. The Chair may prompt, if necessary, if an area has not been covered
.	Round two: repeat same order. Round three: if necessary, same order.
5 minutes	Ask candidate if he/she wishes to say anything else.

DECISION

1. Ask the candidate to leave. Ask each member of the committee:

    a. Is the candidate's general knowledge in field of his/her thesis sufficient for the awarding of the degree? If reservations are expressed, determine a suitable procedure for the candidate to meet this requirement.

    b. Is the thesis:
        i. Acceptable as is?

ii. Acceptable with revisions? Final approval is normally vested in the supervisor.
iii. Requiring major revisions?

If so, the committee must adjourn after deciding upon a date to reconvene (no later than 6 months following). It should be made clear to the student (in writing) what is required before the examination is reconvened. FGSR must be advised in writing of the adjournment and the conditions specified to the student.

Note that there is no category "accepted with major revisions".

iv. Not acceptable.

This will necessitate a rewrite using better information on the topic, or a new topic. The Vice-Dean of FGSR must be informed in writing the reasons for the rejection. A recommendation can also be made as to the suitability of the candidate continuing in the program.

A favorable decision is either of (i) or (ii) above.

"Normally, if all but one member of the committee agrees on a decision, the decision shall be that of the majority, except when the one dissenting vote is that of the external examiner. If this happens, it must be reported to the Associate Dean, FGSR, who will determine an appropriate course of action. If two or more dissenting votes are recorded, the department will refer the matter to the Associate Dean, FGSR, who will determine an appropriate course of action."
-FGSR Program Manual

In the case of a decision (iii) or (iv), the Associate Chair should be notified immediately.

2. Re-admit candidate and explain the decision of the committee. In the event of an unfavorable decision, some tact will be required. The supervisor may wish to quickly outline the decision before the student is readmitted to the examination room. Modifications to the thesis which are typographical in nature should be given to the candidate for incorporation into the thesis.
3. The student should bring the Thesis Approval/Program Completion form to the exam and Part 2 will be completed by the examining committee at the end of the in camera discussion. The committee chair initials on behalf of the external reader if the reader does not attend the doctoral exam.
4. Supervisor(s) normally withhold their signature(s) pending completion of minor corrections at the discretion of the committee.

Thank everybody and close the exam.

After all examiners and supervisor(s) have signed, Part 3 will be completed by the Associate Chair, Graduate. One copy of the form will be kept for Department file and original sent to the FGSR.

COMMENTS:

1. Most oral examinations take at least two hours. Make sure room booking time is adequate.
2. Make sure the candidate knows that the supervisor(s) probably would not have called the oral if he/she does not think the candidate is ready.
3. Let the candidate use what audio-visual aids are necessary to him/her. The candidate probably knows best because it is his/her work (or should be!).
4. Try to foster an atmosphere of relaxed confidence.
5. Let the student answer the questions!