MAE Graduate Student Handbook

General Procedures and Guidelines

Clarkson University
Department of
Mechanical and Aeronautical Engineering

Fall 2019
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INTRODUCTION

This handbook contains the degree requirements for graduate programs in the Mechanical and Aeronautical Engineering (MAE) Department at Clarkson University.

It is the responsibility of the degree candidate, working in conjunction with his/her faculty advisor, to choose a plan of study, including coursework and thesis/project work that will lead to the completion of a graduate degree. The student should read these requirements carefully and become familiar with the requirements for his/her degree.

Also contained in this handbook are various forms that must be completed at various times and procedures for M.S. Non-Thesis project, M.S. thesis and Ph.D. dissertation. The student should become familiar with this information and insure that all of the forms are completed in a timely manner and that proper procedures are followed for completing his/her thesis or dissertation.
GRADUATE DEGREE REQUIREMENTS IN MECHANICAL ENGINEERING

The departmental graduate program in Mechanical Engineering is structured to provide the student with a series of goals to be attained in an orderly fashion throughout the course of study. The ultimate goal in this sequence is the granting of the Master of Science (M.S.) or Doctor of Philosophy (Ph.D.) degree, following a successful completion of the program. The general requirements of the Graduate School are described in the university catalog. The formal requirements for the M.S. and Ph.D. in Mechanical Engineering are set forth as follows:

I. Requirements for the M.S. Degree

A. UNIVERSITY REQUIREMENTS (Consult Clarkson Catalog for complete details)
   1. A minimum of 30 credit hours of graduate coursework, as follows.
      a. At least 20 credit hours of course and seminar work. The balance of coursework must be consistent with the research or professional experience component.
      b. Only courses numbered 500 and above are accepted for graduate credit.
      c. 10 credit hours of transfer credit (B grade or better) may be accepted.
   2. Satisfactory completion of one of the research or professional experience components listed below.
      a. A written thesis based on independent research;
         A thesis submitted in partial fulfillment of the requirements for the Master of Science degree will be examined by a committee of at least three Clarkson faculty appointed by the student’s department. After approval by the examining committee, a thesis requires signature approval by the Dean of the Graduate School, and two copies of the thesis will be deposited in the University library.
      b. A comprehensive examination;
         A comprehensive examination taken in partial fulfillment of the requirements for the Master of Science degree will be administered by a faculty member or faculty committee approved by the appropriate academic administrator.
      c. An appropriate, professionally oriented special project;
         A project submitted in partial fulfillment of the requirements for the Master of Science degree will be examined by a faculty member, or faculty-member committee, as approved by the appropriate academic administrator.
   3. At least one academic year of study beyond the B.S.
4. A cumulative GPA of 3.0 in courses used to meet graduation requirements

5. All work must be completed in five calendar years.

B. MECHANICAL ENGINEERING DEPARTMENT REQUIREMENTS (in addition to the above University Requirements)

1 Prerequisites: BS in engineering or equivalent. Students applying from other disciplines will be handled on a case by case basis. Those students who are not fully prepared to pursue graduate work in engineering may be required to take additional courses for which graduate credit will not be given. Admission to the M.S. program will be given only after the required prerequisite coursework has been completed.

2 Requirements:

a. 18 credits of course work

b. 2 credits of seminar

c. Either

i. 10 credits of ME 614 – Thesis/Dissertation with a MAE faculty advisor.

ii. All students must complete a thesis and defend it orally to a committee consisting of a minimum of three Clarkson faculty members. The committee must be approved by the MAE Chair and CSOE Dean using the CSOE Graduate Committee Appointment form. The committee should be approved before the second semester of graduate study.

Or

i. 4 credits of ME 616 – Special Projects with a MAE faculty advisor.

ii. 6 credits of additional course work

iii. All students must complete a project with a written report approved by the Chair of the graduate committee. With the faculty advisor’s approval, students enrolled in industrially sponsored distance learning programs may accomplish 7 credits of project work and 21 credits of course work.

Or

i. Exceptional students may be invited to proceed directly to the Ph.D.; such students will be awarded the M.S. upon completing 40 credit hours and passing the doctoral candidacy procedure (qualifying exam and proposal defense)

d. One credit of ME614 or ME616 may be replaced by ES 542 – Fundamentals of Research and Graduate Study
e. A minimum of two ME graduate courses must be taken.

f. At least one mathematics course must be taken. The following is a list of suggested courses:

   CH561 Engineering Analysis
   ME515 Finite Element Methods
   ME529 Stochastic Processes in Engineering
   ME554 Continuum Mechanics
   MA514 Sets and Topology
   MA521 Classical Complex Analysis
   MA522 Classical Real Analysis
   MA531 Initial and Boundary Value Problems
   MA550 Nonlinear Partial Diff Equation
   MA577 Numerical Methods
   MA578 Numerical Analysis
   MA581 Probability

   Other courses may also be acceptable with the written approval of the MAE Graduate Committee.

   g. No more than two courses may be selected from this group

   ME591 Selected Topics in Materials Engineering
   ME594 Selected Topics in Manufacturing
   ME618 Selected Topics in Heat Transfer
   ME628 Special Topics in Fluid Mechanics
   ME657 Selected Topics in Solid Mechanics

h. At least 15 course credit hours must be in engineering. No more than two dual numbered courses may be taken for graduate credit

   The M.S. student has the option of continuing towards a Ph.D. degree if accepted into the Ph.D. program by the MAE Graduate Committee.

II. Requirements For the Dual M.S./M.B.A. Degree

   Detailed information on the dual MS Non-Thesis/MBA Program is available at http://www.clarkson.edu/engineering/graduate/ME_MBADualDegreeOption.html

A. MECHANICAL ENGINEERING REQUIREMENTS

1. Prerequisites: BS in mechanical engineering or equivalent

2. Program Duration: Two years. During the first year the student completes ME degree
requirements. During the second year the MBA requirements are completed.

3. ME requirements: Requirements for the ME degree listed under item I must be accomplished

B. SCHOOL OF BUSINESS REQUIREMENTS

1. Check with the School of Business for the most recent requirements for the MBA degree.

III. Requirements for the Ph.D. Degree

A. UNIVERSITY REQUIREMENTS (consult Clarkson Catalog for complete details)

1. 90 credit hour’s minimum (beyond the B.S.)
   a. Minimum of 24 credit hours of course work (see Mechanical Engineering section for additional requirements)
   b. Minimum of 6 credit hours from a department other than the one in which the student is housed
   c. Minimum of 6 credit hours of seminar

2. 60 credit hours earned in residence at Clarkson
   a. Two years of full-time study in residence at Clarkson.
   b. Maximum of 30 hours of graduate transfer credit (B grade or better).
   c. Official transcripts need to be provided before transfer credit is awarded.

3. All work must be completed within 7 years after the student is identified as a PhD candidate. A minimum of three academic years of full-time graduate study or the equivalent in part-time study is required.

4. The comprehensive examination (qualifying examination and research proposal defense examination) for admission to candidacy must be taken within two years after admission to the PhD program. A student will be dropped from the program if the exam is failed twice.

5. A dissertation must be submitted and defended orally before an examining committee. The examining committee will consist of a minimum of five members, four of whom must be Clarkson faculty members. At least one of the faculty must be from a department other than your advisor's department. With the approval of the Provost, the fifth member may be any person with appropriate credentials from either inside or outside the University.

6. The program for research assistants (RA) and teaching assistants (TA) will include at least 1 credit hour of thesis each semester.
7. A student in the Ph.D. program who has not yet passed the comprehensive examination will be called a Ph.D. student. After the examination is passed the student will be called a Ph.D. candidate.

B. MECHANICAL ENGINEERING DEPARTMENT REQUIREMENTS (in addition to the above University Requirements)

1. A minimum of 39 credit hours of course work.

2. At least two additional ME courses beyond the M.S. degree course requirements (part of the 39 course credit hours required).

3. In order to monitor a student's progress toward a Ph.D., the following sequence of examinations and presentations are required (the exact form and timing of these are presented in separate sections of these requirements):

   a. Qualifying Examination
   b. Research Proposal Defense Examination
   c. Examination on the Dissertation

   Note: A student is considered a Ph.D. candidate after passing both the Qualifying and Research Proposal Defense Examinations.

4. A qualifying examination based on general preparation in the major field, must be taken at the first offering after the student completes one semester in the Ph.D. program. M.S. students may take the exam one time prior to completion of their M.S. thesis with written permission from their advisor. This is a written examination covering a general background in the area of mechanical engineering. If a Ph.D. student fails any portion of this exam, studies cannot proceed until approval is obtained from the Department Chairman and from the Dean of the Graduate School. If a Ph.D. student fails the qualifying exam twice, the student will be dropped from the Graduate School.

   The Qualifying Examination is composed of two written parts:


   b. Mechanical Engineering Science: Statics, dynamics, fluid mechanics, strength of materials, thermodynamics, heat transfer, vibration and material science/metallurgy.

   The exam is closed book. The two parts of the exam are scheduled within a one week time period. Missing an exam counts as failing the exam. The MAE Graduate Committee is responsible for administering and making arrangements for grading the exams.
5. Ph.D. Course Selection: Courses that a Ph.D. student takes to complete course requirements must be mutually agreed upon by the student and advisor. Students and advisors must define the major field of study (15 credits minimum) and minor field of study (9 credits minimum) on the Ph.D. Degree Program Form. Examples of suitable major fields include fluid mechanics, solid mechanics, controls, materials, etc. An example of a minor field could be mathematics, numerical methods, or solid mechanics for a student whose major field is fluid mechanics. A student whose major field is solid mechanics could have a minor field of mathematics, materials, fluid mechanics, controls, etc. There are many possible combinations of major and minor fields of study. However, the choices must be supported by appropriate courses. With the advisor’s consent, a student’s minor field could be innovation and entrepreneurship. This program, offered by the Clarkson School of Business, consists of three of the following four courses: OM676, Developing and Managing Technology; SB613, Entrepreneurship and New Venture Creation; MK 689, New Product Marketing; and OM680, Strategic Project Management.

6. In order to provide guidance to Ph.D. students, a Degree Committee must be selected within one year of entry into the Ph.D. program and prior to the student’s Research Proposal defense. In consultation with the student, the Committee will be selected by the student's Major Professor, who also serves as the dissertation advisor. Approval for the Degree Committee must be obtained from the MAE Department Chair and the Dean of the Graduate School. The Committee will consist of a minimum of five members, of which a minimum of three must be faculty members from Clarkson's MAE Department and at least one must be from a department at Clarkson other than MAE. This Committee will judge the technical competence of the Research Proposal, the dissertation and other oral presentations. With the Provost’s approval, additional Committee members may be appointed from outside the faculty as necessary.

7. A formal oral presentation of a Research Proposal must be made to the Degree Committee within two years after enrollment in the Ph.D. program. It is also required that this proposal be made at least one year prior to the completion date of the research work. The major purpose of the proposal defense examination is to provide an opportunity for the Degree Committee to evaluate the technical competency of the student and the scientific merit of the proposed research, and to make critical but constructive suggestions regarding the proposed work. The proposal may be brief, but must describe clearly the proposed research as well as the research carried out so far. It is required that the proposal be distributed to the Degree Committee prior to the formal presentation. The Research Proposal must be accepted by the Degree Committee for successful completion of the proposal defense examination.

8. Before the final dissertation examination can be taken, the candidate must submit at least two research articles to academic journals. At the time of the examination, these papers
must be either under review or accepted by the journal.

9. A final dissertation examination must be passed. The candidate must submit an announcement flyer to the MAE Graduate Coordinator at least one week prior to the dissertation examination. Prior to submission, the flyer must be approved by the advisor. The final dissertation examination will include, as a minimum, an oral examination based on the dissertation. The candidate will present and defend his/her dissertation. The Degree Committee and the Dean of the Graduate School must approve the dissertation.
10. The chronological sequence and corresponding administrative responsibility are listed in the following table:

<table>
<thead>
<tr>
<th>Admission to Program</th>
<th>MAE Graduate Committee</th>
<th>Dept. Chair</th>
<th>Degree Committee</th>
<th>Dean Graduate School</th>
<th>Time Limits</th>
<th>Forms</th>
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<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>A1,A2,A3</td>
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<tr>
<td>Completion of Qualifying Examination</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Approval of Degree Committee</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>B1</td>
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<tr>
<td>Approval of Research Proposal</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>B2</td>
<td></td>
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<tr>
<td>Approval of Dissertation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>C1,C4</td>
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Must take first offering after one semester of enrollment in the Ph.D. program. one attempt allowed prior to completion of M.S. with advisor’s permission.

Prior to Research Proposal and within 1 year of matriculation in Ph.D. Program

Within 24 months of matriculation in Ph.D. program. (Part time students see note 3)

At least 1 year after research proposal, but within 7 years of becoming a PhD candidate

NOTES:

1. Final copies of accepted dissertations or thesis must be received by the Graduate School no later than ten working days before commencement to qualify a student to receive a degree at the end of the spring semester (May commencement). This date is published each semester by the Provost’s office. Graduating students should check this date.

2. The copy of the thesis or dissertations must be distributed to the members of degree committee at least one week before the date of oral examination.

3. For part time students, the 24 month rule is replaced by “before 33 credit hours are completed toward the Ph.D.”
IV. Thesis Advisor

The thesis/project advisor for M.S. Non-Thesis, M.S. and Ph.D. students in Mechanical Engineering must be a full time mechanical engineering faculty member. A faculty member from another department who has a courtesy/research appointment in MAE Department could co-advice a mechanical engineering student with a full time departmental faculty.

New graduate students with TA support will be assigned advisors based on their research interests and those of the faculty that qualify for a TA position. Students should meet with every MAE faculty member and indicate their four choices of faculty. This is done using the Research Meetings with MAE Faculty” form available in the MAE Department (257 CAMP).

V. Additional Requirements

For a graduate student to continue a minimum of B average is required. A graduate student who obtains more than two C or lower grades (although he/she may have a B average) will be subjected to a MAE Graduate Committee review before the student is allowed to continue. The Graduate Committee will request bi-annual progress reports from the graduate student regarding his/her performance in course work, seminar and research.

Teaching Assistantship, Research Assistantship, Fellowship, Instructorship, etc. are awarded on a competitive basis. To receive consideration for TA support, the student must have a B or better average. For M.S. degree students, the departmental support will be limited to a total of three semesters. For Ph.D. degree students the departmental support will be limited to a total of two years. Support for the Ph.D. student during the first year should be from an RA (except for newly hired tenure track faculty). Financial assistance in the form of a partial tuition waiver may be given to M.S. Non-Thesis or M.S. students on a competitive basis.

Qualifying foreign students with M.S. degrees from foreign countries will be admitted to the Ph.D. program provisionally. Each of these students are required to take the Ph.D. qualifying examination the first time it is given after his/her tentative admission to the Ph.D. program. If the student does not pass this exam, he/she will automatically be required to pursue a M.S. degree before being considered again for admission to the Ph.D. program.

The Graduate School may grant permission to a graduate student to participate in a Co-op experience. Eligibility for Co-op is limited to those graduate students who have matriculated (i.e., been accepted and enrolled) as a full-time student in residence in one of Clarkson’s graduate degree programs for at least one regular semester and have maintained a GPA of at least 3.0 for all graduate coursework. The graduate students’ request for permission to participate in the Co-op experience must include (1) a written acknowledgement that she or he has discussed the program with a Career Center counselor; (2) documentation that indicates the Co-op experience is appropriate to the professional and educational objectives of the student, including a statement from the student’s graduate program advisor; and (3) a coursework and project/thesis plan that indicates the student’s
intended path to completing degree requirements.

Seminar Attendance: Graduate students are expected to attend the MAE seminar series every semester they are in their respective programs. Students should additionally register for one credit of seminar until the seminar credit requirements for the degree have been met. After their first year in the Ph.D. program, under some circumstances, Ph.D. students may register for two seminar credits in one semester. The student must obtain written permission from the seminar coordinator to register for two seminar credits, and a copy of the permission memorandum must be presented to the MAE graduate coordinator for inclusion in the student’s graduate record. The permission memorandum must include specific activities that the student must accomplish to receive the second credit. Typically, these activities could include attending ten additional seminars from other departments and documenting the attendance using the form at, or presenting a full-length seminar. The seminar coordinator will make the final decision concerning what activities will be required to earn the second credit. With prior approval of the seminar coordinator, off-campus students can receive seminar credit by attending ten professional presentations and documenting their attendance using Form A (see page 14).
FORM FOR
NON-MAE/OFF-CAMPUS MAKE-UP SEMINARS
ME610 SEMINAR SERIES

Department of Mechanical and Aeronautical Engineering (MAE)
Clarkson University

Student Name: ________________________________________

Term: Fall _ Spring __ of year 20 __

<table>
<thead>
<tr>
<th>Date</th>
<th>Title of Seminar or Topic Presented</th>
<th>Signature of Presentation Coordinator</th>
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Please fill in the general information about the seminars that you attended. You may also include seminars you have formally presented during the semester. To receive credit in ME610 (MAE Seminar), you must attend or participate in ten seminars. Please return the signed form a week before finals week to the MAE seminar coordinator.