Welcome to the Texas Tech University Mechanical Engineering Graduate Program. The goals of our graduate program are to (1) create an effective learning environment that provides consistent, high-quality educational opportunities to all students, and (2) promote scholarly achievement for both faculty and students. This graduate guidebook is a living document to provide guidance to students on policies designed to ensure that the graduate program reaches these goals.

This guidebook contains graduate school and mechanical engineering department graduation requirements as well as department policies. Although this guidebook is intended to be a common source for all information, it is ultimately student’s responsibility to verify graduation requirements and necessary deadlines. Questions or suggestions on the guidebook’s content should be directed to the Chair or Director of Graduate Program.

Sincerely,

Jharna Chaudhuri                                      Siva Parameswaran
A Brief Introduction to the ME Department

Mechanical engineering is the broadest of the engineering disciplines. Graduates from the Department of Mechanical Engineering at Texas Tech University complete a curriculum that provides a strong foundation in mathematics and the physical sciences of chemistry and physics followed by an in-depth education in five of the principal mechanical engineering areas: thermal science, fluids engineering, mechanics and materials, dynamics and controls, and mechanical design. Graduates from the Department will find employment opportunities covering a wide spectrum, including the aerospace, automotive, petroleum production and refining industries, electrical power, electronics, semiconductors, manufacturing, and production, as well as research positions in industry and government laboratories. Problem-solving techniques learned in the mechanical engineering curriculum are also applied to continued educational pursuits or graduate study in engineering, as well as in areas such as law, medicine, business administration, and other professions.

The B.S. degree in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700. The Department of Mechanical Engineering is a tremendous asset to the college of engineering, Texas Tech University, the State of Texas and Nation. According to ASEE data our department was ranked 23rd in producing BSME graduates in 2008 (total of 274 schools reported). Currently the department consists of twenty eight (nine new faculty joined in last five years including one Endowed Chair) highly qualified faculty members from a diverse background who are committed to excellence in research and teaching. Four of the faculty members are fellows in their professional organizations and many receive numerous excellences in teaching and research awards.

The department offers fully accredited, BSME, MSME and Ph. D. degrees. It has a thriving undergraduate population of 1000 students and a graduate student population of 100 (50 MS and 50 Ph. D. students). The Department of Mechanical Engineering dates back to 1925 at the inception of Texas Tech University. BS program started at that time with the BSME degree conferred first time to six students in 1929. The MS program for the department was approved in 1959 and Ph. D. in 1965. Our students are of high quality and receive numerous awards. Our graduates from all three programs are highly marketable and receive jobs in various industries, academia and national laboratories, mostly in Texas but also nationwide.

Comprehensive nature of Texas Tech University has fostered collaborative educational, research and service programs between mechanical engineering and biology, chemistry, physics, philosophy, mathematics, health, medicine, agriculture, etc. The department takes pride in its internationally known research programs in energetic materials, nano-materials, failure and residual stress analysis, biomechanics, micro- and nano-technology, fluid mechanics, wind farm modeling, tornado simulation, energy, robotics, trans-disciplinary research, automotive, etc. The faulty are engaged with many centers of research excellence in the college of engineering and university.

We have a strong tradition of valuable service to the larger community. Among others, our faculty members are involved with trans-disciplinary research and education programs and are working with Raytheon Corporation for last seven years. The seamless automotive technology program is working with community colleges and the Lubbock independent school district to transform high school students with automotive background into Mechanical Engineers. Our faculty members are editors of highly reputed journals, organize conferences, serve on professional technical committees, organize Robotic competition, etc.

We work very closely with Industry Advisory Board Members and ME Academy members to improve our program continuously.
ADMISSION REQUIREMENTS

Admission to the Mechanical Engineering MS and Ph.D. programs is subject to the requirements of the Texas Tech University Graduate School. Complete details regarding admission may be obtained from: Graduate School, Texas Tech University, Box 41033, Lubbock, TX, 79409. A brief summary of these requirements follows.

Initiating An Application

Application materials may be obtained by contacting the Graduate School at the above address. In addition to the application form, applicants must provide official transcripts which document the last two years of their undergraduate studies and any graduate studies which have been completed. Applicants must also provide scores from the aptitude portion of the Graduate Record Examination (ORE) which is administered by: Educational Testing Service, 20 Nassau Street, Princeton, NJ, 08540. The GRE is required for all students. Students who have not completed the GRE can be admitted as "special students" for up to two semesters in order to complete the GRE. Students admitted on a "special" basis will be dropped from the graduate program if their GRE scores do not meet departmental requirements.

Application materials are processed by several offices, and time must be allowed for transcripts and test scores to be received. Students in the United States should allow at least three months for the processing of their application. Students looking for financial support must apply much earlier.

Admission Requirements

Graduates of ABET-accredited mechanical engineering programs are required to have a cumulative grade point average of 3.0 or better for the last 60 hours of courses completed. In addition, a high score in GRE will increase the chances of admission with financial aid to the Ph.D. program. Graduates of programs other than mechanical engineering will be required to take leveling courses. Specific leveling programs are tailored to the background of the applicant. These courses are not applicable to the requirements of the MS or Ph.D. degrees.

International Students

In addition to the above requirements, international students are required to submit scores from the Test of English as a Foreign Language (TOEFL) as well as the GRE before admission will be granted. They must also provide evidence of financial support while in the United States prior to being admitted. A fee is required for processing applications from outside the United States. The Department is not able to waive the required fee nor can we make a preliminary assessment of the likelihood of admission. Nine or more months are normally required for the processing of international student applications.
University Academic Regulation

ME Department complies unconditionally with the university’s regulations. The details of the University Academic Regulation can be found at: http://www.depts.ttu.edu/officialpublications/catalog/GradSchool.php

1. Outside-department course

Although there is a possibility that a graduate student can take courses outside the ME department, please be advised that you need pre-approval to do so. Otherwise the course may not be counted as effective and helpful in your degree plan. Please consult your advisor before you register for any outside-department course.

2. Full-time study

The following table shows the allowed credit hours for each semester.

<table>
<thead>
<tr>
<th>Semester/Session</th>
<th>MS Student (min – max)</th>
<th>Ph.D. Student (min - max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>9 – 16</td>
<td>9 - 13</td>
</tr>
<tr>
<td>Fall</td>
<td>9 – 16</td>
<td>9 - 13</td>
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<tr>
<td>Summer I</td>
<td>3 – 6</td>
<td>3 - 6</td>
</tr>
<tr>
<td>Summer II</td>
<td>3 – 6</td>
<td>3 - 6</td>
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</table>

Spring and fall semesters are two regular semesters which are required for all graduate students. If you are on fellowships, assistantships and/or other appointments (TA, RA, GA), you are required to keep your full-time study status in both summer sessions. That means you need to take at least 3 credit hours in EACH summer session of the two summer terms, which makes it at least 6 credit hours in total.

A Ph.D. student who is required to register solely for the purpose of satisfying a continuous enrollment requirement needs not register for more than 1 credit hour during each term. However, a doctoral student who is involved in internship, research, or another type of academic study should register for credit hours in proportion to the teaching effort required of the program faculty. Students supported by the department needs to take at least 9 credit hours during regular semesters and 3 credit hours for each summer semester.

3. Continuous enrollment

Students who have begun thesis or dissertation research must register for 6000 or 8000 courses in each regular semester and at least once each summer until all degree requirements have been completed, unless granted an official leave of absence from the program for medical or other exceptional reasons. Off-campus students may register for 1 hour of 6000 or 8000 with departmental approval until their final semester, at which time they must enroll for at least 3 hours. Students receiving financial assistance must register for the number of hours required by Financial Aid.
Approval of a leave of absence will not extend the allowed time for completion of the degree.

4. **Leave of absence**

Any student who fails to register during a fall or spring semester and who does not have an official leave of absence from study is subject to review for readmission by the standards in effect at the time of reconsideration. Official leave of absence, which is granted by the dean of the Graduate School upon departmental recommendation, may be requested only in case of serious medical conditions and other exceptional reasons. Normally, leaves of absence will not exceed one year. Leaves of absence do not extend the maximum time allowed for completion of the degree.

5. **Required thesis/dissertation hours**

Registration for at least 6 hours of 6000 is required for the master’s thesis and at least 12 hours of 8000 for a doctoral dissertation. Once the project is begun, a student must be enrolled in such courses every semester until completion. A student should enroll under the committee chairperson; however, in those instances in which other professors on the committee are making substantial contribution to the student’s research, it is permissible for the student to enroll proportionally under those professors. Students certified as off-campus may enroll for as little as 1 hour until their final semester, at which time 3 hours minimum are required.

Students may not enroll in thesis or dissertation courses before formal admission to a degree program by the graduate dean.

Enrollment for thesis or dissertation courses is permitted only during a regular registration period. Students away from the campus may, however, register for such courses by mail, provided arrangements are made with the registrar’s office by telephone or electronically prior to the beginning of a registration period.

Students are required to register for appropriate courses in every semester or summer term in which they expect to receive assistance, use the facilities of the university, or take comprehensive examinations.

The number of hours for which students must enroll in each semester depends on their level of involvement in research and their use of university facilities and faculty time. Students in residence who are devoting full time to research should enroll for 9 to 12 hours.

6. **Registration in the semester of graduation**

There are three official graduation dates: December, May, and August. Every candidate for a graduate degree must be registered in the Graduate School in the session of graduation. Students must be registered for at least 3 hours of coursework at the 6000 level (thesis option) or the 8000 level (doctoral students) or they must register for 1 hour of non-thesis coursework at the 7000 level (individual study) if all requirements are met. Failure to graduate at the expected time requires such additional registrations as may be necessary until graduation. A new “Statement of Intention to Graduate” is required for each semester.
7. **Maximum allowable doctoral hours**

Students not making timely progress toward completion of the doctoral degree are subject to termination by the graduate dean. The Texas Legislature has capped fundable graduate study at 99 doctoral hours for most programs and may impose sanctions upon universities permitting registration for excess hours. Graduate students with more than 99 doctoral hours will be required to pay out-of-state tuition, regardless of residence status. The maximum time allowed for completing the doctoral degree is EIGHT years from the first doctoral semester or FOUR years from admission to candidacy, whichever comes first. The graduate dean must approve exceptions or extensions in advance.

8. **Maximum allowable graduate hours (except doctoral programs)**

Students who are in programs other than doctoral programs and are not making timely progress toward completion of their degree are subject to termination by the graduate dean. Graduate students beyond the maximum allowable graduate hours as determined by the Texas Legislature may be required to pay out-of-state tuition, regardless of residence status. The maximum time allowed for completing a master's degree is six years. The graduate dean must approve exceptions or extensions in advance.

9. **Change in schedule and withdraw**

A graduate student who wishes to add or drop a course must initiate such action with the graduate advisor for his or her program. A student who quits a course without official withdrawal is likely to receive an F in that course.

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**Academic Probation and Suspension**

Every student enrolled in the Graduate School, whether working toward a degree or not, is required to maintain a high level of performance and to comply fully with the policies of the institution. The Graduate School reserves the right to place on probation or to suspend any post-baccalaureate or graduate student who does not maintain satisfactory academic standing or who fails to conform to the regulations of the university.

Students who are admitted to a degree program on condition of maintaining a required GPA are automatically on academic notice. Failure to fulfill the conditions stipulated at the time of admissions will result in termination from the program.

Student’s whose cumulative GPA falls below 3.0 are placed on academic probation and have two consecutive semesters to raise their cumulative GPA to at least 3.0. If their semester GPA drops below 3.0 during the two-semester period, students are subject to suspension. Students placed on suspension are required to remain out of the Graduate School for one semester. Summer sessions and/or trimester count as one semester. In accordance with OP 64.07, any student who has been suspended must appeal
to the Graduate School if reinstatement is desired. A student who is suspended twice will not be allowed to return to the Graduate School. Students may be suspended for unprofessional conduct such as cheating or plagiarism. Any appeal of such action is subject to the provisions of the Code of Student Conduct. See the *Student Handbook* for further information.

**Preliminary knowledge:** eraider, pre-registration, registration, adding and dropping a course, minimum and maximum credit hours, your grades, your transcript, quitting or changing your program, academic honesty, academic probation and suspension, graduate student responsibilities

**Department of Mechanical Engineering Safety Protocols**

The safety protocols can be viewed and downloaded at: [http://www.me.ttu.edu/ME/SafetyPlan](http://www.me.ttu.edu/ME/SafetyPlan)

**A List of Graduate Level Courses**

ME department class website: [http://www.me.ttu.edu/ME/ClassWebsites](http://www.me.ttu.edu/ME/ClassWebsites)

ME 5120 Graduate Seminar  
ME 5301 Analysis of Engineering Systems  
ME 5302 Numerical Analysis of Engineering Systems  
ME 5311 Advanced Dynamics  
ME 5312 Control Theory  
ME 5313 Control Theory II  
ME 5314 Nonlinear Dynamics  
ME 5316 Advanced Vibrations  
ME 5317 Robot and Machine Dynamics  
ME 5321 Advanced Thermodynamics  
ME 5322 Conduction Heat Transfer  
ME 5323 Two-Phase Flow and Heat Transfer  
ME 5325 Convection Heat Transfer  
ME 5326 Combustion  
ME 5327 Advanced Heat Transfer  
ME 5330 Boundary Layer Theory  
ME 5332 Potential Flow  
ME 5334 Gas Dynamics  
ME 5335 Mathematical Models of Turbulence  
ME 5336 Computational Fluid Dynamics  
ME 5338 Advanced Fluid Mechanics  
ME 5339 Transmission Electron Microscopy
ME 5340 Elasticity  
ME 5341 Plasticity  
ME 5342 Fracture and Failure Analysis  
ME 5343 Contact Mechanics of Engineering Materials  
ME 5344 Introduction to High Pressure Science and Technology  
ME 5345 Computational Mechanics I  
ME 5346 Computational Mechanics II  
ME 5347 Phase Transformation I  
ME 5349 Nonlinear Mechanics of Materials  
ME 5350 Mechanics of Composite Material  
ME 5351 Advanced Engineering Design  
ME 5352 Probabilistic Design  
ME 5353 Fundamental of Trans-disciplinary Design and Process  
ME 5354 System Engineering Principles  
ME 5355 Complexity Theory for Design and Process  
ME 5356 Digital Human Modeling for Human-Centric Design  
ME 5357 Trans-disciplinary Discovery and Innovation  
ME 5360 Bio-Fluid Mechanics  
ME 5362 Orthopedic Biomechanics  
ME 5385 MEMS I  
ME 5386 MEMS II  
ME 5387 MEMS III  

ME 6000 Master's Thesis  
ME 6301 Master's Report  
ME 6330 Advanced Topics in Mechanical Engineering (Lecture)  
ME 6331 Theoretical Studies (Self-study)  
ME 7000 Research  
ME 8000 Doctor's Dissertation  

Note:  
1. Elasticity is a required course for Mechanics major.  
2. ME 6331 and ME 7000 can be repeated both three times, but maximum credit hours enrolled under same professor is 9 hours counting all lecture, individual studies & research courses (this does not include ME 6000, ME 6301 or ME 8000). ME 7000 is not allowed for MS program thesis option. 3 credit hours of ME 7000 is allowed for MS program report/course only options; additional hours may be approved if the student participates in Co OP/internship.  
3. The title of ME 6330, ME 6331 and ME 7000 depends on the course instructor. If you register for ME 6330, ME 6331, or ME 7000, you have to ask the course advisor for a specific title for this course.  
4. All courses are NOT offered in every semester but in a rolling base, depending on the availability of professors, classrooms and other resources. Please check “Classes offered: (http://www.depts.ttu.edu/officialpublications/courses/ME.php)” for available courses in a specific semester and carefully plan what courses to take.
Software packages supported by ME Department

A list of software packages is available at:
http://www.me.ttu.edu/ME/TheDepartment/SupportedSoftware
Currently, the ME department supports MATLAB, ANSYS, Inventor 11, NI Labview, Solidworks and MathCAD. These software packages are available on all computers in the open computer laboratory.

Academic Program Requirements for Graduate Degrees

Common Requirements

There are two common requirements for both MS and Ph.D. students.

1. Graduate Seminar

One credit hour of graduate seminar (ME 5120) is required for all graduate students. Students register for this course in their first full-time graduate semester, but must attend seminars throughout their entire academic career, until completion of the requirement. This may include any of the Mechanical Engineering departmental seminars, as well as any external seminars approved in advance by the ME Graduate Advisor.
To find information about Mechanical Engineering seminars, please see the schedule by checking:
http://www.depts.ttu.edu/me/includes/seminars/docs/full-seminar-series.pdf
To find external seminars, please see the Advising Office for a list of approved presentations. Alternatively, you may find a seminar yourself and bring an abstract to the Advising Office IN ADVANCE for approval. In either case, a feedback sheet must be picked up from the Advising Office before attending any external seminars and it must be turned in to the Advising Office as soon as possible afterwards.
PLEASE NOTE: For MS students that graduate in less than the average amount of time, the attendance requirement will be 80% of the number of ME seminars offered during your tenure in the department as a graduate student.

2. Academic regulations

Dept. of Mechanical Engineering complies with the graduate school's code: Academic Probation and Suspension of Graduate Studies (OP64.04), and furthermore, the department will permit only a single grade of C for courses listed on the Official Degree Plan. If a student earns two or more C's or any single grade less than C, he or she must meet with a group consisting of the Faculty Advisor, Advisory Committee, and the Department Graduate Advisor. This group will recommend appropriate action, which may include probation or suspension by the Department.
MS Degree Requirements

The Graduate School of Texas Tech University sets the policies and regulations regarding admission, minimum grade requirements, final examinations, and other such items of interest to the student. Students should obtain and study the current Graduate Catalog in order to be familiar with these regulations. This Procedures Manual presents information specifically concerning the Master of Science in Mechanical Engineering (MSME).

Leveling Requirements

Most students will have a Bachelor’s degree in Mechanical Engineering upon entering the program. Some students, however, will have undergraduate or graduate degrees from other technical disciplines and will be required to take leveling courses in preparation for graduate studies in mechanical engineering. The courses listed below or their equivalents are minimum leveling requirement for students who have not graduated from a mechanical engineering program. Additional courses may be required depending upon the background of the student, and will be assigned on a case by case by the Department Director of Graduate Program or the student’s Advisory Committee. Leveling courses do not apply toward the requirements of the MSME degree.

Minimum Leveling Requirements

- Six hours of thermal science courses (e.g. ME 3322, ME 3370, ME 3371)
- Six hours of mechanical science courses (e.g. ME 2311, ME 3331, ME 3433, ME 3464)
- Computational Methods (ME 2315)
- All undergraduate math courses in the BSME curriculum

MSME Options

The MSME is a graduate degree requiring an additional 18 to 24 months of study beyond the undergraduate degree, BSME. Currently, the Department offers the three master’s program options: thesis option, report option and coursework option. Students in pursuing each program option must select and designate a major area of study from the four streams available: 1 - Solid Mechanics, 2 - Thermofluids and Heat Transfer, 3 - Dynamics and Controls, and 4 - Design. Students are required to submit a degree plan during their first semester. For information about degree plans as well as the form, please visit:

http://www.me.ttu.edu/ME/GraduateProgram/CoursesandDegreePlans

In order to obtain the MS degree, you need to satisfy the Graduate Seminar requirements as well as the academic regulations mentioned above, and:
1. Faculty advisor and advisory committee

Each graduate student must have a Faculty Advisor from the Graduate Faculty of the Mechanical Engineering Department to advise them on academic, thesis, or report matters. The Department Graduate Advisor will temporarily serve as the Faculty Advisor for each student during the student’s first semester in the master’s degree program. Each student should choose a permanent Faculty Advisor by the end of the first semester of attendance and report this advisor to the Department Graduate Advisor. The Faculty Advisor will assist the student with the selection of a thesis or report topic and the courses needed to satisfy the requirements of the MSME degree.

Students pursuing an MSME degree with a thesis or report option must have an Advisory Committee to assist with academic and thesis matters. This committee is chaired by the Faculty Advisor and consists of the Faculty Advisor and a minimum of TWO additional graduate faculty members for the thesis option and a minimum of ONE additional graduate faculty member for the report option. This committee is responsible for approval of the student’s thesis/report. This committee should be selected as soon as possible after the student has selected a Faculty Advisor and before the second semester of enrollment. Committee membership is formalized when the student files the Official Degree Program and Admission to Candidacy.

2. Final exam

All MS students must pass a final examination before graduating. The final examination requires a synthesis and application of knowledge acquired during the course of study and research leading to the master’s degree; no student should expect the evaluation to be based solely on performance in the classroom. A student who fails the final examination may repeat it after a period of two months or more.

3. Thesis option

(a) The thesis option requires a minimum total of 30 credit hours, consisting of a minimum of 24 hours of course-work, and six hours of ME 6000 Master’s Thesis.
(b) Nine hours of course-work must be selected from the designated courses in the students’ selected major area. Please go to: http://www.me.ttu.edu/ME/GraduateProgram/CoursesandDegreePlans to check the courses.
(c) At least six hours of course-work must be in the designated breadth areas (breadth areas are areas outside the students’ major area, but within Mechanical Engineering).
(d) All thesis students are required to take 6 hours of advanced mathematics.
(e) In addition to the core and breadth courses, students must take an additional 3 hours of graduate level course-work designated as graduate free elective. This free elective could be selected from any of the areas inside the ME department, other engineering departments, and/or sciences (independent study or special topics are also acceptable). Also, if a student participates in a graduate internship/Co-op, an ME 7000 may be included on their official degree plan to replace/satisfy the free-elective requirement.
(f) No ME 7000 is allowed on the official degree plan without internship/Co-op.
(g) In situations where the students’ thesis is highly interdisciplinary and requires extensive course work outside the department, the two breadth courses and the additional free elective may all be taken in
other departments or colleges as needed. The faculty advisor must notify the graduate advisor of this necessity in written.

(h) Time required to complete the thesis option Master's degree is usually between 18 and 24 months.

(i) F-1 international students may not use a graduate internship/coop as graduate research, ME 7000, unless it is an integral part of the student's academic program and is stated so in writing by the student's academic advisor (per United States immigration regulations).

(j) Students pursuing a MS degree in Mechanical Engineering with a thesis option must submit to the graduate school a written thesis that is approved by the students’ Advisor and Advisory Committee. The Master’s thesis represents the results of original and significant research work in Mechanical Engineering conducted by the student under the supervision of the Faculty Advisor and Advisory Committee. The thesis must be prepared in strict conformance with the requirements described in the booklet Instructions for Preparing and Submitting Thesis and Dissertations available at the Texas Tech University Bookstore. As stated in the booklet, it is the student's responsibility to be sure that English usage is proper and that the physical form (margins, spacing, etc.) is acceptable. Students are encouraged to employ assistance (typically students majoring in English) in correcting their thesis or report manuscripts prior to submittal to their Faculty Advisors. Masters candidates are required to defend their thesis in an oral presentation to their Advisory Committees. A draft of the thesis must be provided to the Advisory Committee at least one week prior to the defense. The date and place of the defense presentation must be advertised two weeks in advance of the defense and the presentation must be open to the public. Failure to follow these guidelines may delay graduation.

(k) Thesis defense is the final examination for the MS program with thesis option in Mechanical Engineering.

4. Report option

(a) The report option requires a minimum of 36 hours consisting of 33 hours of course-work and three hours of ME 6301, Master’s report.

(b) Nine hours of course-work must be selected from the designated courses in the students’ major area. Please go to: http://www.me.ttu.edu/ME/GraduateProgram/CoursesandDegreePlans to check the core courses.

(c) At least six hours of course-work must be in the designated breadth areas (breadth areas are areas outside the students’ core area, but within Mechanical Engineering).

(d) All report students are required to take 6 hours of advanced mathematics.

(e) In addition to the core and breadth courses, students must take an additional 12 hours of graduate level course-work designated as graduate free elective. These free electives could be selected from any of the areas inside the ME department, other engineering departments, and/or sciences (up to three hours may be independent study or special topics).

(f) Up to three hours of free elective courses may be substituted by graduate research, ME 7000, on the official degree plan. If a student participates in a graduate internship/coop, an additional 3 hours of ME 7000 may be included on their official degree plan to replace three additional hours of free-elective.

(g) Time required to complete the report option Master's degree is usually between 15 and 18 months.

(h) F-1 international students may not use a graduate internship/coop as graduate research, ME 7000, unless it is an integral part of the student's academic program and is stated so in writing by the student's academic advisor (per United States immigration regulations).
(i) The master's report is not as extensive as a thesis and may represent work other than original research, but the quality of the work and the level of activity will still be expected to meet the high standards required for a master's degree in mechanical engineering. A final approved copy of the report must be supplied to the Mechanical Engineering Department for archival purposes. The report need not conform strictly to the Graduate School booklet, but rather to the individual requirements of the student's Faculty Advisor. The student must satisfy their report committee by giving a formal report presentation that is open to faculty and students. Students are required to present a draft of the report one week prior to the presentation. An announcement of the presentation must be given to the Department two weeks in advance of the presentation.

(j) Report defense is the final examination for the MS program with report option in Mechanical Engineering.

5. Coursework option

(a) The coursework option requires a minimum of 36 hours consisting entirely of coursework.

(b) Nine hours of course-work must be selected from the designated courses in the students’ selected major area. Please go to: http://www.me.ttu.edu/ME/GraduateProgram/CoursesandDegreePlans to check the courses.

(c) At least six hours of course-work must be in the designated breadth areas (breadth areas are areas outside the students’ core area, but within Mechanical Engineering).

(d) All coursework option students are required to take 6 hours of advanced mathematics.

(e) In addition to the core and breadth courses, students must take an additional 15 hours of graduate level course-work designated as graduate free elective. These free electives could be selected from any of the areas inside the ME department, other engineering departments, and/or sciences (up to three hours may be independent study or special topics).

(f) Up to three hours of free elective courses may be substituted by graduate research, ME 7000, on the official degree plan. If a student participates in a graduate internship/coop, an additional 3 hours of ME 7000 may be included on their official degree plan to replace three additional hours of free-elective.

(g) Time required to complete the coursework option Master's degree is usually between 15 and 18 months.

(h) F-1 international students may not use a graduate internship/coop as graduate research, ME 7000, unless it is an integral part of the student's academic program and is stated so in writing by the student's academic advisor (per United States immigration regulations).

(i) The MS course-work only option requires a final examination to be administered by the ME departmental Graduate Advisor. The exam will be geared on courses taken by the student toward the student’s selected program. Coursework students should check with the Graduate Advisor regarding the format of the exam.

Ph. D. Degree Requirements

In order to obtain the Ph.D. degree, you need to satisfy the Graduate Seminar requirements as well as the academic regulations mentioned above, and:
1. Course work requirements

The Doctor of Philosophy program in Mechanical Engineering (Ph. D.) is a graduate degree requiring a minimum of three years of graduate study beyond the undergraduate degree. It is awarded to students who have completed a program of graduate courses, a final examination, and a dissertation.

The doctorate requires at least 60 semester hours of graduate work, exclusive of the dissertation. No more than 30 semester credit hour of an earned Master’s degree from another institution may be transferred. A student will be required to take two math courses and two other courses from the courses listed below. The remaining 18 hours may consist of ME 7000, ME 6331, or additional graduate courses. A student may not include more than 9 hours each of ME 7000 or ME 6331 courses. Each of the ME 7000 and ME 6331 courses should have a unique prefix identifying the class name. The Graduate School’s custom and practice is to reject all degree plans when a student is taking more than 9 hours with a single professor because this is not consistent with the guidelines of Southern Association of Colleges and Schools (SACS).

The balance of the graduate courses required for a degree program may be selected from mathematics, science, and engineering with the approval of the Faculty Advisor and Advisory Committee. All courses must carry graduate credit. Students should obtain the approval of the offering department when taking courses outside of Mechanical Engineering to be sure that they have the appropriate prerequisites. All students are required to submit a degree plan during their first semester.

Students enrolled in the Ph.D. program are required to complete two math courses and two core courses from two different groups, totaling 4 courses, listed below. However, with the approval of his/her advisory committee, core course requirements can be exempted.

Math Course 1
- ME 5301 - Analysis of Engineering Systems,
- MATH 5310, or
- MATH 5311

Math Course 2
- ME 5302 - Numerical Analysis of Engineering Systems,
- MATH 5334,
- Math 5335, Math 5384, Math 5385 or
- CE 5310

Course 3
- ME 5311 - Advanced Dynamics or
- ME 5316 - Mechanical Vibrations I

Course 4
- ME 5321 - Thermodynamics,
- ME 5319 - Advanced Heat Transfer, or
- ME 5320 - Advanced Fluid Mechanics

Course 5
ME 5340 - Elasticity
ME 5342 - Fracture and Failure Analysis
ME 5345 - Computational Mechanics I
ME 6330 - Mechanics of Nanomaterials

Course 6
ME 5353 - Transdisciplinary Design & Process
ME 6330 - Automotive Systems
ME 5351 - Advanced Engineering Design
ME 5352 - Probabilistic Design
ME 5355 - Complexity Theory for Design & Process
ME 6330 - Digital Human Modeling

Further details about the various requirements for completing the Ph. D. degree follow. A chronological check sheet is attached for the student's use. In order to avoid delays in graduation students should regularly review this check sheet to be sure that requirements are being met on schedule. For information about degree plans as well as the form click the link:
http://www.me.ttu.edu/ME/GraduateProgram/CoursesandDegreePlans

2. Journal publication requirement

The department of Mechanical Engineering requires, as part of its PhD degree requirements, that all its PhD degree candidates have at least one technical paper submitted to an archival journal relevant to the candidate's field of expertise prior to the defense of their PhD thesis. The individual faculty advisors reserve the right regarding journal publication requirement beyond one paper submitted.

3. Faculty advisor and advisory committee

When a student first begins a graduate studies program he/she is assigned to the Departmental Graduate Student Advisor. During the first semester of attendance, students should seek a Faculty Advisor. This advisor assists the student with the selection of a dissertation research topic and the courses needed to earn the Ph. D. degree. A Faculty Advisor should be selected by the student and reported to the Department Graduate Student Advisor by the end of the first semester of attendance. Each student pursuing the Ph. D. program must also have an Advisory Committee to assist with academic and dissertation matters. This committee is chaired by the Faculty Advisor and consists of the Faculty Advisor plus a minimum of FOUR additional graduate faculty members, excluding the Graduate Dean's representative. Students are strongly encouraged to have at least one member from outside the Department. This committee is responsible for the comprehensive examination and approval of the dissertation. This committee should be selected shortly after the student has selected a Faculty Advisor and prior to the end of the first year of attendance. Committee membership is formalized when the student files for admission to candidacy.
4. Qualifying exam

The Qualifying Examination for Admission to Candidacy for the doctor's degree is one of the major features of the doctoral program and will be administered in both the major and minor areas of study. A student is eligible to stand for this examination after receiving approval of the doctoral proposal from the Dean of the Graduate School and completing most of the course work prescribed by the approved proposal (e.g., the student should be in his/her last semester of coursework). At this point, the student should also provide an abstract of his thesis to the Department Graduate Student Advisor.

Following two options are available for a student who is required to take the Qualifying Exam:

(1) Project-based option
(2) Subject-based option

Project-based option

If a student and his advisor choose this option, then, the student will be examined on a research topic NOT part of his/her thesis. The examination consists of two parts: (a) written part (b) oral part. In the written portion of the exam, the student will provide a written report on his research topic to the committee. After examining the written part, the committee will examine the student in an oral setting on the chosen research topic. If the committee finds the student’s performance is satisfactory in both written and oral parts of the exam, the student will be allowed to proceed to the next stage. If the performance is unsatisfactory, then, the student will be given one more chance to take the examination after four months.

Subject-based option

If a student and his advisor choose this option, the examination is normally prepared and administered by the candidate’s Advisory committee or any other professors the committee may consider necessary. The Qualifying Examination consists of two parts; (a) Written portion and (b) Oral part. The committee assigns a topic for each member who will then administer a written examination on that particular topic. Once the doctoral student completes the written examination with each committee member, the committee meets as a group and administers the oral portion of the Qualifying Examination. The procedure outlined in the Graduate Catalog applies when the examination is satisfactory or not satisfactory. If the student performance is not satisfactory, then the student will be given one more chance to take the examination after four months.

5. Admission to candidacy

Authority for admitting an applicant to candidacy for a doctoral degree is vested in the Graduate Council. Once a recommendation is received from the advisory committee, the Graduate Dean will submit it to the Graduate Council for action. The council may approve the committee’s recommendation, or it may, after consultation with the committee, suggest additional requirements for the applicant to satisfy. A student must be admitted to candidacy for the doctorate at least four months prior to the proposed graduation date.
6. Dissertation

A dissertation is required of every candidate for a doctoral degree. This requirement is separate and apart from other requirements in doctoral programs; consequently, successful performance in other areas does not necessarily guarantee the acceptance of a dissertation. The dissertation work must earn a grade of at least B in order to qualify the student for graduation.

The doctoral dissertation represents the results of original and significant research work in mechanical engineering conducted by the student under the supervision of the Faculty Advisor and Advisory Committee. The dissertation must be prepared in strict conformance with the requirements described in the Graduate School booklet, "Instructions for Preparing and Submitting Reports, Thesis, and Dissertations." As stated in the booklet, it is the student’s responsibility to be sure that English usage is proper and that physical form (margins, spacing, etc.) is acceptable. Students who have difficulty with writing proper English are encouraged to employ assistance (typically students majoring in English) in correcting their dissertation or report prior to submittal to their Faculty Advisor. Students must defend their dissertation to their Advisory Committee. A draft of the thesis must be provided to the Advisory Committee three weeks prior to the defense. An announcement of the defense must be given to the Department three weeks in advance of the defense.

7. Minimum residence and time limit

The minimum residence time for a Ph. D. is one full academic year of graduate study beyond the master’s degree or beyond the equivalent of this degree if the student proceeds to doctoral work without getting a master’s degree. All work for the doctorate must be completed within four years after the applicant has been admitted to candidacy. Students whose graduate study is interrupted by military service will be granted an extension of time for the period of their military service, not to exceed five years.

8. Final Oral Examination

A final public oral examination, usually over the general field of the dissertation, is required of every candidate for the doctorate. The oral examination must be scheduled by the student and the advisory committee after the committee has read the completed dissertation and prior to the defense deadline during the semester of graduation. Students should present their dissertation to all committee members at least three weeks before the defense date. In addition, the Graduate School requires three weeks notification prior to the oral examination. The required Defense Notification Form noting the time, place, and other information concerning the examination is available on the Web site (www.depts.ttu.edu/gradschool/current/thd.php).

The advisory committee and the graduate dean or a professor designated to act in place of the graduate dean conduct the examination. All members of the committee participate fully in the examination and cast a vote. Professors other than members of the committee, including the graduate dean’s representative who is expected to come from outside the academic department, may participate in the examination but have no vote in determining the outcome. At the conclusion of the examination, the chairperson of the advisory committee will send a written notice to the Graduate School giving the result of the examination.
Guideline for Students

Teaching Assistants

TA’s will be assigned to specific undergraduate courses on a semester-by-semester basis. The TA should report to the professor in charge of their assigned course one week before the course begins. TA duties will include such tasks as: assisting the faculty in the conduction of courses, grading laboratory reports, homework assignments, and exams, and running discussion sessions. Occasionally, TA’s may be asked to conduct a lecture in the absence of the faculty member in charge. It is a Departmental practice that TA’s will not be used on a regular basis to teach classes other than laboratory classes. A TA appointment at the Master’s level is given for a maximum of 4 regular semesters and at the PH. D. level for a maximum of 8 regular semesters. However for students coming directly in the PH. D. program with a BS degree can have a TA appointment for a maximum of 10 regular semesters.

It is the responsibility of the TA to be familiar with the course material and with the operation of the course. This will, at a minimum, require close communication with the professor in charge, and may require that the TA attend some or all of the lectures/problem sessions. It is the responsibility of the faculty to inform the TA of their specific duties in a timely fashion so that they may be adequately prepared.

All TA’s are expected to be available to students of the class to which they are assigned as a TA. Establishing office hours is recommended.

A TA’s load is 20 hours/week spent assisting classroom learning. Some courses will require significant preparation when school is not in session. All TAs are expected to work on their research during semester breaks. All TAs are expected to attend department’s seminar on a regular basis. TAs at the MS level are expected to have one journal publication submitted. TAs at the Ph. D. level are expected to have 2 to 3 journal publications submitted.

Research Assistants (RA’s)

RA’s will report to their faculty advisors on the first day of their assignment. RA’s will be responsible for conducting research related to the project to which they are assigned. The specifics of these duties will be communicated to the student by the faculty advisor. As with TA’s, the RA’s load is 20 hours/week of responsibilities that may or may not be directly related to their thesis research.

Graduate Scholarship Recipients

Graduate students who are given departmental scholarships are expected to attend department’s seminar on a regular basis. Department’s graduate scholarships are given for a maximum of 4 regular semesters to MS students and a maximum of 8 regular semesters to Ph. D. students. Students with a TA or a RA position do not receive a departmental scholarship.

General
All funded students (TA, RA, fellowship, etc.) are expected to be present during undergraduate school vacations and semester breaks to work on their research. Absences will be handled by the Department Chair and Graduate Coordinator for unassigned TA’s and by the specific research advisor for RA’s and TA’s.

Continuation of support for all funded students depends upon the satisfactory performance of their assigned duties as well as their academic progress including both course work and research. Graduate students are expected to do their part in creating a scholarly environment which enhances effective learning and professional growth. Example actions include but are not limited to:

a) taking responsibility for laboratory safety, maintenance, and training of new personnel,
b) academically challenging and stretching fellow graduate students and faculty by discussing their own work and other’s work for the personal growth of themselves and others,
c) seeking expertise within and beyond the Department to achieve research goals,
d) continuously pursuing research goals and a deep understanding of both general mechanical engineering principles and their specific research area, and
e) writing conference papers and journal publications. For the MS thesis option candidates at least one journal publication is expected. For a Doctoral Candidate, 2 to 3 journal papers are expected.

Expectations of Faculty

Students should expect the faculty to be committed to creating a scholarly environment where effective learning and professional growth are enhanced. Actions toward this goal include but are not limited to the following:

a) providing opportunities in core courses for students to develop a graduate-level understanding of mechanical engineering principles,
b) challenging and stretching students to achieve high standards of excellence,
c) encouraging students to broaden their knowledge of mechanical engineering as well as to develop expertise in an area of research, and
d) including new technology areas in elective and core courses.

Financial Support

1. Departmental support

The ME department provides Teaching Assistantship (TA), Research Assistantship (RA), Graduate Assistantship (GA), Student Assistantship (SA), and scholarship to support qualified students. Talk with your supervisor about the availability and other detailed information.
2. Graduate School Support and Scholarships

Graduate school has various scholarships and fellowships which may help you financially.
Go and check: www.depts.ttu.edu/gradschool/scholarships
or send an E-mail to gradfellowships@ttu.edu for detailed information.
Here is a list of 2009-2010 Graduate Scholarships and Fellowships provided by Graduate School. All ME graduate students are encouraged to apply.

<table>
<thead>
<tr>
<th>All Majors May Apply – No Nomination Required</th>
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</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Cash Family Endowed Fellowship</td>
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<tr>
<td>Hazlewood Memorial Fellowship</td>
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<tr>
<td>Helen DeVitt Jones Fellowship</td>
</tr>
<tr>
<td>Helen DeVitt Jones Fellowship (Part-time students)</td>
</tr>
<tr>
<td>McNair AT&amp;T Graduate Fellowship</td>
</tr>
<tr>
<td>Smith Graduate Scholarship</td>
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<tr>
<td>Student Gov’Assn (STAGE) Scholarship</td>
</tr>
<tr>
<td>Summer Dissertation/Thesis Research Award</td>
</tr>
</tbody>
</table>

NOTE: All listed above are open to new and continuing students (domestic and international).

<table>
<thead>
<tr>
<th>All Majors May Apply – Departmental Nomination Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>AT&amp;T/Chancellor’s Fellowship (New student only)</td>
</tr>
<tr>
<td>CH Foundation Doctoral Fellowships (New student only)</td>
</tr>
<tr>
<td>Horn Professor’s Graduate Achievement Award (Current student only)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Only Specific Majors May Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
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<tr>
<td>American-Mexican Friendship</td>
</tr>
<tr>
<td>– Waterman Scholarship</td>
</tr>
<tr>
<td>Covenant Fellowship</td>
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<tr>
<td>Junction Summer Scholarship</td>
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<tr>
<td>Water Research Scholarship</td>
</tr>
</tbody>
</table>

NOTE: All listed above are open to new and continuing students (domestic and international).

Gelin Emergency Loan Fund:
Loan ranges from $500 to $2,500. All applicants must be full-time graduate students, be in good-standing with the Graduate School and have a financial need. Loans of $500 or less should be paid back within 120 days, at 0% interest, after the loan is received. For loans up to $2,500, repayment typically begins two to three months after the student receives the funds. The loan must be paid back within five years at 0% interest. For additional information, please go to:
www.depts.ttu.edu/gradschool/funding/gelin.php
Student Advising - ME Department Advising Office

Our staffs are ready to help ME students in ME 140.

ME Department Improvement Program

1. Graduate Student Advisory Committee
2. Industrial Advisory Board Members- Student Dinner Committee
3. Graduate Faculty Advisor
4. Chair

Student Associations in ME Department

1. ASME TTU ME Branch
2. Formula F-1 Student Association
3. Engineers without Border Student Association
4. Women in Mechanical Engineers (WIME)
5. Society Hispanic Professional Engineers (SHPE) TTU Chapter

Research Fields and Laboratories in ME Department

http://www.me.ttu.edu/ME/Research/Overview

Faculty and Staff

http://www.me.ttu.edu/ME/FacultyStaff/FacultyDirectory

Masters Programs: Required Steps

<table>
<thead>
<tr>
<th>ACTION</th>
<th>INITIATED THROUGH</th>
<th>SUBMITTED TO</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plan courses for degree</td>
<td>Graduate Advisor</td>
<td>Graduate Advisor</td>
</tr>
<tr>
<td>2</td>
<td>Set up thesis advisory committee and title, if applicable</td>
<td>Graduate Advisor</td>
<td>Graduate Advisor</td>
</tr>
<tr>
<td>3</td>
<td>File &quot;Program for the Master's</td>
<td>Graduate</td>
<td>Graduate School</td>
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<tr>
<td></td>
<td>Action</td>
<td>Responsible Party</td>
<td>Target Date</td>
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</tr>
<tr>
<td>4</td>
<td>File changes in degree program, if necessary</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>As needed</td>
</tr>
<tr>
<td>5</td>
<td>Enroll in semester of graduation (at least 3 hours of thesis, if defending thesis)</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>Semester of graduation</td>
</tr>
<tr>
<td>6</td>
<td>File &quot;Statement of Intention to Graduate&quot; form, including official title of thesis, if applicable. (Not to be confused with the &quot;Program for Master's Degree and Admission to Candidacy&quot; form see #3 above)</td>
<td>Student</td>
<td>Semester of graduation no later than posted deadline (One must be filed for each intended graduation semester)</td>
</tr>
<tr>
<td>7</td>
<td>Schedule final comprehensive examination and/or defense. Send memo to the Thesis Coordinator indicating the time and date of the defense.</td>
<td>Student (thesis option)</td>
<td>Semester of graduation (usually about 6 weeks before graduation or no later than posted deadline)</td>
</tr>
<tr>
<td>8</td>
<td>After the defense, the chair sends result by memo to Graduate School Masters Coordinator</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>Semester of graduation (usually about 6 weeks before graduation or no later than posted deadline)</td>
</tr>
<tr>
<td>9</td>
<td>Obtain committee signatures on the Thesis-Dissertation Approval Form and submit to Graduate School</td>
<td>Student (thesis option)</td>
<td>Prior to deadline during semester of graduation</td>
</tr>
<tr>
<td>10</td>
<td>Pay the Thesis-Dissertation fee, if applicable</td>
<td>Student (thesis option)</td>
<td>Prior to deadline during semester of graduation</td>
</tr>
<tr>
<td>11</td>
<td>After incorporating committee changes, submit .pdf file of thesis to the ETD site for official review</td>
<td>Student (thesis option)</td>
<td>Semester of graduation (usually 5 weeks before graduation date or no later than posted deadline)</td>
</tr>
<tr>
<td></td>
<td>Action</td>
<td>Initiated Through</td>
<td>Submitted To</td>
</tr>
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<td>---------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Plan courses for degree</td>
<td>Graduate Advisor</td>
<td>Graduate Advisor</td>
</tr>
<tr>
<td>2</td>
<td>Take preliminary exam (option)</td>
<td>Graduate Advisor</td>
<td>Graduate School</td>
</tr>
<tr>
<td>3</td>
<td>Set up doctoral advisory committee and title</td>
<td>Graduate Advisor</td>
<td>Graduate School</td>
</tr>
<tr>
<td>4</td>
<td>File &quot;Program for the Doctoral Degree&quot; form</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>Graduate School or Doctoral Coordinator</td>
</tr>
<tr>
<td>5</td>
<td>File changes in degree program, if necessary</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>Graduate School or Doctoral Coordinator</td>
</tr>
<tr>
<td>6</td>
<td>Take Qualifying Examination for major and minor subjects (Qualifying Exam and Admission to Candidacy Recommendation Form)</td>
<td>Graduate Advisor or Chair, Advisory Committee</td>
<td>Graduate School</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
<td>Responsible Parties</td>
<td>Timeframe</td>
</tr>
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</tr>
<tr>
<td>7</td>
<td>Recommendation for admission to candidacy (request by memo)</td>
<td>Chair of Committee, Graduate School</td>
<td>After passing qualifying exam and no later than 4 months before graduation</td>
</tr>
<tr>
<td>8</td>
<td>Enroll in semester of graduation if all requirements are met (at least 3 hours)</td>
<td>Graduate Advisor or Chair, Advisory Committee, Registrar</td>
<td>Semester of graduation</td>
</tr>
<tr>
<td>9</td>
<td>File &quot;Doctoral Intent&quot; form with official title of dissertation listed</td>
<td>Student, Graduate School</td>
<td>Semester of graduation (One must be filed for each intended graduation semester.)</td>
</tr>
<tr>
<td>10</td>
<td>Pay the Thesis-Dissertation fee through Student Business Services</td>
<td>Graduate School, Dissertation Supervisor, Student Business Services</td>
<td>Semester of graduation (This is paid only once.)</td>
</tr>
<tr>
<td>11</td>
<td>Schedule final oral defense of dissertation and submit &quot;Doctoral Final Oral Examination Notification Form&quot; at least 3 weeks before defense</td>
<td>Student, Committee Chair, and Advisory Committee, Graduate School, Dissertation Supervisor</td>
<td>At least 3 weeks before defense</td>
</tr>
<tr>
<td>12</td>
<td>Stand for final oral defense of dissertation and send result by memo to the Graduate School (Doctoral Defense Report)</td>
<td>Advisory Committee, Graduate School, Doctoral Coordinator</td>
<td>Semester of graduation</td>
</tr>
<tr>
<td>13</td>
<td>Submit signed Thesis-Dissertation Approval Form and after incorporating committee changes, submit .pdf file of dissertation to ETD site for review.</td>
<td>Student, Advisory Committee, Graduate School, Dissertation Supervisor</td>
<td>Semester of graduation (usually 5 weeks before graduation date)</td>
</tr>
<tr>
<td>14</td>
<td>Final grade for dissertation hours (A or B)</td>
<td>Committee Chair or Advisory Committee, Registrar-Final Grade Roll</td>
<td>End of semester</td>
</tr>
<tr>
<td>15</td>
<td>Submit official .pdf of dissertation to ETD web site (DMA students submit PDF programs to ETD site and turn CDs in to the Graduate School)</td>
<td>Student, Graduate School, Dissertation Supervisor</td>
<td>Prior to deadline</td>
</tr>
<tr>
<td>16</td>
<td>Complete Doctoral Survey</td>
<td>Student</td>
<td><a href="http://survey.norc.uchicago.edu/doctorate">http://survey.norc.uchicago.edu/doctorate</a></td>
</tr>
</tbody>
</table>