



Department of Mechanical Engineering *Graduate Program Guide*

INTRODUCTION

The Department of Mechanical Engineering of the Cullen College of Engineering offers these graduate degree programs for full-time and part-time students:

Master of Science (M.S.) with thesis in Mechanical Engineering. This program focuses on *engineering science* in one of several areas of specialization. A formally defended thesis describing research into a topic of current academic interest is the centerpiece of this program.

Master of Science (M.S.) without thesis in Mechanical Engineering. The focus of the non-thesis program can be varied between *engineering science* and *engineering practice* through a selection of elective courses from the Colleges of Engineering, Natural Science, Business, and Law.

Doctor of Philosophy (Ph.D.) in Mechanical Engineering in several areas of specialization. The Ph.D. is the highest degree granted by the University and its possession signifies that the holder has demonstrated the ability to perform original research. The principal objective is to produce a dissertation that can be considered a significant contribution to the knowledge base in mechanical engineering. Our standard Ph.D. program assumes a completed M.S. degree prior to admission. Our Direct Admit program allows the exceptional student to be admitted to doctoral candidacy without a completed M.S. degree.

The College also offers graduate-level interdisciplinary programs in Materials Engineering and Aerospace Engineering. Those programs offer both the M.S. and Ph.D. in their respective disciplines. The Department of Mechanical Engineering is the administrative home of these programs, and documents describing them are available from the Admissions Analyst in the Mechanical Engineering.

THE M. S. PROGRAMS

To be unconditionally admitted to the M.S. thesis or non-thesis program, an applicant should have:

- a Bachelor's degree in Mechanical Engineering or in a related field, preferably from an accredited engineering program.
- a grade point average of at least 3.00 out of 4.00 on the last 60 semester credit hours attempted exclusive of extracurricular credits.
- a competitive score on the Graduate Record Examination (GRE).
- three letters of recommendation attesting to the student's capacity to perform in the classroom and/or a research capacity. Letters from industrial supervisors are accepted; however, we prefer that at least two letters be from faculty members who have observed the academic performance of the applicant.
- a Statement of Purpose that is consistent with the areas of instruction and (for applicants to the thesis program) the current research areas within the Department.
- a minimum score of 79 on the internet-based TOEFL examination for students whose native language is not English.

Texas law prohibits the definition of minimum acceptable scores on the GRE. However, *average scores* for a recent admission class for all programs were 777 on the Quantitative section and 574 on the Verbal section.

Acceptance to the program is based on a competitive combination of academic background, GRE scores, and recommendation letters and Statement of Purpose. Domestic applicants who are not clearly competitive in all three areas may be admitted on a conditional basis at the discretion of the Director of Admissions. Non-immigrant visa holders may not be admitted conditionally.

Program of Study for the M. S. in Mechanical Engineering with Thesis

The program requires completion of a minimum of 30 credit hours distributed as follows:

- Nine hours of thesis credits (the first three for MECE 6399, the remaining for MECE 7399).
- Three hours of mathematics satisfied by the first course in one of these approved sequences:
 - MECE 6384, 6385
 - CHEE 6331, 6332
 - PHYS 6303, 6304
 - or the two-course sequence, MATH 4335 and 4336. The student must complete both courses (6 hours) to satisfy the requirement. Contact the MECE Admissions Analyst to register for MATH 4335/36.
- At least nine hours from the MECE 6000-level or above, exclusive of the seminar (MECE 6111), research credits (MECE 6x98), and thesis credits.
- The remaining hours must be at the 6000-level or above from any department in the College of Engineering or the College of Natural Science and Mathematics.

If a graduate course is dual-listed with an undergraduate 5000-level section, the student must enroll in the graduate section. Approval of any course that falls outside of the description given here must be requested by petition to the Director of Graduate Studies. Approval must be received prior to enrollment in the course.

The graduation requirements for this program are a successfully defended thesis and at least a 3.00 grade point average over all courses. The Director of Graduate Studies must approve the composition of the thesis examining committee prior to the defense date. The committee consists of at least three tenure-track faculty members, with one member from outside the Department.

Program of Study for the M. S. in Mechanical Engineering without Thesis

The program requires successful completion of 33 hours of course work distributed as follows:

- Three hours of mathematics satisfied by the first course in one of these approved sequences:
 - MECE 6384, 6385
 - CHEE 6331, 6332
 - PHYS 6303, 6304
 - or the two-course sequence, MATH 4335 and 4336. The student must complete both courses (6 hours) to satisfy the requirement. Contact the MECE Admissions Analyst to register for MATH 4335/36.
- Eighteen hours from the MECE 6000-level or above, exclusive of graduate seminar (MECE 6111) and Graduate Project (MECE 6368).
- Twelve hours at the 6000-level or above from any department in the College of Engineering, the College of Natural Science and Mathematics, the Bauer College of Business, or the UH Law Center. A total of no more than six hours can be from Business and Law. Three hours can be satisfied by completing the directed-study Graduate Project course, MECE 6368. A statement of the intent of the directed study must be approved by petition to the Graduate Director prior to registration in MECE 6368. A report describing the results of the project must be filed with, and archived by, the instructor at the end of the course.

If a graduate course is dual-listed with an undergraduate 5000-level section, the student must enroll in the graduate section. Approval of any course that falls outside of the description given here must be requested by petition to the Director of Graduate Studies. Approval must be received prior to enrollment in the course. Non-thesis students should not enroll in research or thesis courses (6x98, 6399, 7399).

The graduation requirements for this program are at least a 3.00 grade point average over all courses, and separately, at least a 3.00 grade point average on the twenty-one or more hours comprised of all MECE courses and the course(s) used to satisfy the mathematics requirement.

DOCTOR OF PHILOSOPHY IN MECHANICAL ENGINEERING

Admission to the Program

To be admitted for doctoral studies, a student must have an exemplary scholastic record which includes

- an M.S. degree (standard admission) or a B.S. degree (direct-admit program) in Mechanical Engineering or in a related field, preferably from an accredited engineering program.
- three letters of recommendation attesting to the student's capacity to perform in the classroom and in a research capacity. A minimum of two letters should be from tenure-track faculty members who have observed the academic performance of the applicant.
- a Statement of Purpose that is consistent with the current research areas within the Department.
- a grade point average that demonstrates the potential to perform at the level of 3.40 or better in MECE graduate courses.
- a GRE score that is competitive with the doctoral admission class.
- a minimum score of 79 on the internet-based TOEFL examination for students whose native language is not English.

Degree Requirements

Standard Program. This option assumes that the applicant has completed an M.S. degree from a recognized university. A minimum of 51 hours of approved graduate study beyond the hours completed for the M.S. degree are required. These hours include at least 30 hours of Research and Dissertation credit and at least 21 hours of course work at the 6000-level or higher composed of

- three hours of mathematics beyond the M.S. level as described in the Mathematics Requirement.
- at least 9 hours of MECE courses,
- a two-course Breadth Requirement,
- the remaining courses are from any department in the College of Engineering, or the College of Natural Science and Mathematics.

A comprehensive qualifying examination is required early in the degree program, and a dissertation examination is required at the end.

Direct-Admit Program. This option assumes that the applicant is being admitted without a completed M.S. degree. Students who begin in the M.S. program may petition to transfer into the Direct-Admit

Ph.D. if they have demonstrated exemplary course work and research potential. This option requires a minimum of 66 hours of approved graduate study beyond the hours completed for a baccalaureate degree in engineering. These hours include at least 36 hours of Research and Dissertation credit and at least 30 hours of course work at the 6000-level or higher composed of

- six hours of graduate mathematics as described in the Mathematics Requirement below,
- at least 12 hours of MECE courses,
- a two-course Breadth Requirement
- the remaining courses are from any department in the College of Engineering, or the College of Natural Science and Mathematics.

A comprehensive qualifying examination is required early in the degree program, and a dissertation examination is required at the end.

Mathematics Requirement. One of these approved sequences must be completed prior to standing for the comprehensive qualifying examination:

- MECE 6384, 6385
- CHEE 6331, 6332
- PHYS 6303, 6304

The student may petition that courses from graduate study at another institution be substituted for one or both courses in a sequence. Such a substitution does not reduce the total number of courses in the Program. In any event, the student must be prepared to demonstrate competence in mathematics at the level represented by completion of one of these sequences in the qualifying examination.

Breadth Requirement. Two courses with content outside of the concentration area are required to insure a minimum breadth in the program. The courses can be in MECE or in the Colleges of Engineering and Natural Sciences. The suitability of courses for the breadth requirement is determined petition to the Director of Graduate Studies.

Comprehensive qualifying examination. This oral examination determines whether a student has mastered, and can integrate and apply, the knowledge gained in courses. The student should prepare for the exam by reviewing course material and reflecting on how the information can be integrated to solve problems.

To stand for the qualifying exam, a student must have a grade point average of 3.40 or higher on a minimum of 12 UH graduate hours (4 classes) and no more than the first 21 UH graduate hours (7 classes).

The examination should be scheduled as soon the accumulation of relevant course work allows. For a student with an M.S. from another university, the exam should be attempted no later than 18 months after study towards the Ph.D. begins. For students who complete the M.S. here and for students who petition into the direct-admit program, the exam should be attempted within 12 months of the change of program.

The examination committee is set by the Director of Graduate Studies in consultation with the student and the dissertation advisor. The committee is composed of a minimum of four voting members and the dissertation advisor who serves as a nonvoting member. One of the voting members is responsible for examining the student regarding the content in the mathematics requirement described above. The committee can be composed entirely of MECE faculty; however, members from outside the department may be approved if the nature of the student's program warrants such involvement. Judgment of the examination is by vote; two or more negative votes results in failure of the examination. In the case of failure, the committee shall decide whether or not the student should be invited to take the examination a second time.

Dissertation Examination. A dissertation committee should be formed by the advisor, with the approval of the Director of Graduate Studies, during the semester in which the student passes the comprehensive examination. This committee consists of at least five members including the advisor and at least one member from outside the Department.

Residency. The College requires a minimum of one academic year (two long semesters) of full-time enrollment at the Ph.D. level.

Ninety-nine hour rule. The student should be aware of the scheduling involved in meeting these requirements. University regulations require that a student who has accumulated more than 99 hours at the Ph.D. level be charged out-of-state tuition for the hours in excess of 99. This tuition rate applies to Texas residents as well as true out-of-state students.

ENROLLMENT REQUIREMENTS FOR ALL DEGREE PROGRAMS

A student must meet the requirements listed here for continued enrollment in, and successful completion of, any of our graduate programs:

- Degree plans must be approved by the Director of Graduate Studies and must meet the requirements listed for the degree program. These re-

quirements are in addition to the general requirements of the University as given in the Graduate and Professional Studies Catalog.

- Students on F-1 or J-1 visas are required by U.S. law to be enrolled as full-time students.
- Full-time students must meet the College's published credit-hour enrollment requirements for each semester and summer. These requirements are subject to change and vary with the degree level and the type of Assistantship received.
- Only full-time students are eligible to receive financial support from the University in the form of scholarships, academic fellowships, teaching fellowships or assistantships, research fellowships or assistantships, or other forms of support.
- Continuous enrollment in MECE 6111 Graduate Seminar is required of full-time students.
- A minimum grade point average of 3.00 on all graduate courses attempted is required for the *successful completion* of any graduate degree. See the specific degree program descriptions for any additional graduation requirements.
- No grade lower than C- can be counted toward the completion of the credit hour requirements for a degree program.
- Up to 6 credit hours of course work may be transferred from another institution with the approval of the Director of Graduate Studies.
- No course used for a prior degree can be repeated or applied to another degree.
- No more than 6 hours can be transferred from post-baccalaureate to graduate credit level.
- The *Four-C rule*: the University requires that a graduate student who receives a grade of C+ or lower in 12 semester hours attempted at this institution for graduate credit or for application toward the graduate degree, whether or not in repeated courses, is ineligible for any advanced degree at this institution and will not be permitted to re-enroll for graduate study. Students wishing to enroll in courses *not* for graduate credit (hence not subject to the 4-C rule) must submit a petition to that effect to the Director of Graduate Studies prior to enrollment in those courses.
- Changing degree programs requires approval of the Director of Graduate Studies and of the research advisor and may result in withdrawal of departmental financial support.