

Master of Science Degree – Mechanics, Uncertainty, and Simulation in Engineering

The M.S. degree program with an emphasis in Mechanics, Uncertainty, and Simulation in Engineering (MUSE) is intended to provide students with a strong background in the fundamentals of applied mechanics, applied mathematics, and scientific computing, with an emphasis on applications relevant to civil infrastructure, but not limited to it. At the same time, the program permits considerable flexibility in the selection of courses and participation in research experiences, thereby allowing students to tailor the M.S. program according to their background and educational objectives.

The student is responsible for developing a suitable program of coursework and research in consultation with a MUSE faculty advisor. In addition to conforming to the requirements described below, graduate students in MUSE must follow all rules and requirements of the Graduate School and the Department of Civil, Architectural and Environmental Engineering.

Degree Options

The M.S. degree includes both coursework requirements and opportunities for research. To provide flexibility in balancing the emphasis between coursework and research in their M.S. program, students can choose from one of the following four M.S. degree options.

Thesis Option

The Thesis Option requires a minimum of 30 semester hours for graduation. This includes 24 semester hours of coursework (typically 8 courses) and 6 semester hours for the preparation of a thesis (CE 698A and CE 698B).

Graduate School Report Option

The Graduate School Report Option requires a minimum of 30 semester hours for graduation. This includes 27 semester hours of coursework (typically 9 courses) and 3 semester hours for the preparation of a Graduate School Report (CE 398R).

Departmental Report Option

The Departmental Report Option requires a minimum of 30 semester hours for graduation. This includes 27 semester hours of coursework (typically 9 courses) and 3 semester hours for the preparation of a Departmental Report (CE 398D).

Coursework Only Option

The Coursework Only Option requires a minimum of 30 semester hours of coursework (typically 10 courses) for graduation. There is no research requirement with this option.

Additional Rules

1. Students enrolled in any option can enrol in at most one course (3 hours) on a Credit/No Credit basis.
2. After consultation with a MUSE faculty member, students may include the *Special Studies in CE* course (CE 397) as part of their coursework. CE 397 must be taken for a letter grade and may not be taken more than once.
3. Students receiving research support are expected to complete the Thesis Option.

4. According to Graduate School rules, graduate students must maintain a 3.0 GPA to remain in good standing. Please note that a grade of B- is less than 3.0. Furthermore, only courses in which a student earns a grade of C or better may be counted towards the degree.
5. Students who opt for the Thesis Option or the Graduate School Report Option need to refer to the Graduate School for deadlines and required document preparation formats that need to be followed in preparing their report or thesis. Completed Graduate School Reports and completed Theses are archived and made available through the University's electronic library.

Additional Comments

- Students are not required to make a choice among the four degree options immediately at the time of initial enrolment in the M.S. program. They should discuss the degree options by consultation with a faculty advisor and are encouraged to choose any one of the four degree options sometime during their first semester or early in the second semester in the program.
- The four degree options allow students to vary the balance between coursework and research during their M.S. degree studies. The Thesis Option has the strongest emphasis on research among the four options. The Coursework Only Option has the strongest emphasis on coursework among the four options. The Graduate School Report and the Departmental Report Options lie somewhere between the Thesis and Coursework Only Options in terms of emphasis on research and coursework.
- As described above, students funded as Research Assistants are expected to complete the Thesis Option. However, the Thesis Option is open to all M.S. students in MUSE, whether or not they are funded. Students interested in completing a thesis, but who are not funded as Research Assistants, are encouraged to discuss potential thesis topics with the MUSE faculty.

Prerequisites

Entering M.S. students in MUSE are expected to have completed at least two undergraduate courses in structural analysis, including a course in matrix methods, an undergraduate course in rigid-body dynamics, a course in numerical methods and/or computing/programming, and courses in calculus and differential equations. The student is expected to correct any deficiencies in consultation with a MUSE faculty member. Any remedial courses recommended by MUSE faculty to correct deficiencies may not be counted towards fulfilment of coursework requirements for the M.S. degree.

Course Selection Requirements

All M.S. students entering the MUSE program are encouraged to select appropriate coursework in consultation with a faculty advisor. To guide course selection, the student should consult the following course lists.

Courses

Listed below are courses in closely related fields that may be of interest to graduate students in the MUSE program. Descriptions for most courses are provided in the Undergraduate and Graduate Catalogs of The University of Texas at Austin. Course offerings for each semester are listed in the Course Schedule available at the Registrar's web site. The list is not intended to be exhaustive; it is provided merely to illustrate the wide variety of course available. Students

should choose courses in consultation with a MUSE faculty advisor in accordance with degree requirements.

Civil Engineering - Undergraduate

- CE 358 Introductory Ocean Engineering
- CE 360K Foundation Engineering
- CE 375 Earth Slopes and Retaining Structures

Engineering Mechanics - Undergraduate

- EM 339 Advanced Strength of Materials

Civil Engineering - Graduate

- CE 380P-4 Boundary Element Methods
- CE 381P Computer Methods in Structural Analysis
- CE 381R The Finite Element Method
- CE 381T Numerical Modeling of Physical Systems
- CE 381W Introduction to Wave Physics
- CE 384P Dynamic Response of Structures
- CE 384R Earthquake Engineering
- CE 383F Structural Fire Engineering
- CE 384T Blast-Resistant Structural Design
- CE 384S Structural Reliability
- CE 387G Engineering Geology
- CE 387L-2 Foundation Engineering
- CE 387R-4 Geotechnical Earthquake Engineering
- CE 387T Decision, Risk and Reliability
- CE 393 Advanced Concrete Materials
- CE 393C Experimental Methods in Cement Chemistry
- CE 393N Novel Structural Materials
- CE 397 Structural Health Monitoring - Nondestructive Evaluation
- CE 397 Sustainable Materials
- CE 397 Introduction to Structural Mechanics
- CE 397 Wind Engineering

Engineering Mechanics - Graduate

- EM 380 Theory of Plasticity
- EM 386R Analytical Methods I
- EM 386L Analytical Methods II
- EM 388 Solid Mechanics I
- EM 388L Solid Mechanics II
- EM 388F Fracture Mechanics
- EM 389J Experimental Mechanics

Mathematics

- M 383C Methods of Applied Mathematics
- M 383D Methods of Applied Mathematics

- M 383E Numerical Analysis: Linear Algebra
- M 384C Mathematical Statistics
- M 385C Theory of Probability
- M 385D Theory of Probability

Mechanical Engineering

- ME 378K Mechanical Behavior of Materials
- ME 380Q-1 Engineering Analysis: Analytical Methods
- ME 382T Fire Science
- ME 383Q.2 Vibrations
- ME 386P.2 Mechanical Behavior of Materials
- ME 386Q.10 High-Temperature Materials

Course Selection in M.S. Degree Options – Three Tracks

For the M.S. degree, MUSE students are required to take courses from each of the three tracks below:

Track 1: MUSE Core Courses

Examples include: CE 381P, CE 381R, CE 381T, CE 381W, CE 384P, CE 384S, CE 397 (Blast-Resistant Design), CE 397 (Introduction to Structural Mechanics), CE 397 (Wind Engineering), EM 388, EM 388L.

Track 2: Applied Mathematics Courses

Applied mathematics or numerical analysis courses from one of the following departments/programs: M, EE, ASE/EM, GEO, CAM.

Track 3: Applied Science/Engineering Courses

Courses from the Structural Engineering, Civil Engineering Materials, and Geotechnical Engineering programs in the CAEE department; courses from the BME, EE, ME, and PGE departments.

M.S. students in MUSE who choose the Thesis Option are required to take a minimum of THREE courses from Track 1, ONE course from Track 2, and ONE course from Track 3.

M.S. students in MUSE who choose the Graduate School Report Option, the Departmental Report Option, or the Coursework Only Option are required to take a minimum of THREE courses from Track 1, TWO courses from Track 2, and TWO courses from Track 3.

Within each track, students have the flexibility of substituting other courses than the ones identified above, with consent of a MUSE faculty member.