

MECHANICAL ENGINEERING, MS

Mechanical Engineering Masters Program

Mechanical Engineering (ME) is a foundational discipline that drives technological innovation, economic growth, and quality of life across virtually every industry. The program focuses on three specialized areas: Advanced Materials and Manufacturing, Thermal Systems, and Sustainable Energy.

1. Advanced Materials and Manufacturing (AMM)

This focus area builds upon Tulane's strengths in materials science, nanotechnology, and advanced manufacturing techniques. With rapid advancements in areas such as additive manufacturing (3D printing), composites, and high-performance materials, there is a growing need for engineers trained in the design, processing, and application of next-generation materials. The AMM concentration equips students with expertise in computational materials science, mechanics of materials, and modern manufacturing techniques, preparing them for careers in industries such as aerospace, automotive, biomedical, and energy sectors.

2. Thermal Systems (TS)

Thermal systems engineering is fundamental to nearly all mechanical engineering applications, from energy production and transportation to industrial processes and HVAC systems. This focus area covers advanced thermodynamics, heat transfer, and fluid mechanics, emphasizing the design and optimization of thermal systems such as power plants, heat exchangers, refrigeration systems, and propulsion technologies. Graduates specializing in thermal systems will be well-prepared to work in industries ranging from aerospace and automotive engineering to manufacturing and energy generation.

3. Sustainable Energy (SE)

With increasing global emphasis on energy efficiency and sustainability, this focus area provides students with expertise in renewable energy technologies, energy storage, and sustainable design practices. Topics will include wind and solar power, fuel cells, battery systems, energy-efficient buildings, and carbon reduction strategies. Engineers trained in sustainable energy will contribute to the transition toward cleaner energy solutions, addressing critical challenges in climate change, environmental impact, and global energy demand.

Upon completion of the MCEN program, graduates will be equipped to:

1. Apply Core Mechanical Engineering Principles: Gain expertise in solid mechanics, thermodynamics, fluid mechanics, dynamics, and materials science, with specialization in their chosen focus area.
2. Design and Optimize Engineering Systems: Develop innovative solutions in advanced manufacturing, thermal systems, or sustainable energy by leveraging computational modeling, simulations, and experimental methods.
3. Conduct Independent Research and Innovation: Utilize theoretical and hands-on research skills to explore emerging technologies, develop novel engineering solutions, and contribute to scientific advancements.
4. Collaborate in Multidisciplinary Teams: Work effectively in cross-disciplinary environments, integrating knowledge from mechanical engineering, materials science, energy systems, and applied physics to solve complex engineering challenges.

Graduates of the MCEN program will be well-prepared for leadership roles in a variety of industries, including:

- **Aerospace and Defense** (aircraft propulsion, thermal control, space systems)
- **Automotive and Transportation** (electric vehicles, fuel efficiency, propulsion technologies)
- **Energy and Power Generation** (renewable energy, power plants, thermal energy storage)
- **Advanced Manufacturing** (additive manufacturing, materials processing, nanotechnology)
- **HVAC and Refrigeration Systems** (building energy efficiency, thermal comfort systems)
- **Biomedical Engineering** (prosthetics, medical devices, biomechanics)
- **Research Institutions and Academia**

Requirements

Required Coursework

Applicants may choose one of two paths: 30 credits of coursework from the approved curriculum OR 24 credits of coursework and a 6-credit written research thesis supervised by a Tulane SSE faculty member.

A student may opt for the thesis route only if the student is able to secure a faculty supervisor who agrees to supervise the thesis. The thesis must be based on original research and approved by a committee of at least three members, including the research supervisor and at least one other full-time SSE faculty member. One committee member can be from another Tulane school or an appropriate outside institution. Approval of the research topic

and committee from the Mechanical Engineering Graduate Advisor and consent from all committee members are required before embarking on the thesis.

Coursework for the Tulane ME Master's degree may be selected from any of the following:

Course ID	Title	Credits
Advanced Materials and Manufacturing Focus Area		
MPEN 6390	Synthesis of Nanomaterials	3
MPEN 6290	Computation Material Sci & Eng	3
MPEN 6720	Mechanic Behavior of Materials	3
CENG 6890	Polymer Engr & Science	3
MPEN 6620	MicroFab and Nanotech	3
Thermal Systems Focus Area		
PHYS 7100	Statistical Mechanics	3
CENG 7320	Advanced Transport Phenomena	3
MPEN 6760	Thermodynamics of Materials	3
CENG 6760	Energy and Sustainability	3
Sustainable Energy Focus Area		
CENG 6760	Energy and Sustainability	3
MPEN 6380	Materials for Energy	3
CENG 7320	Advanced Transport Phenomena	3
Additional Engineering Electives		
MPEN 6360	Structure of Materials	3
PHYS 6180	Introduction to Feedback Control and Control Theory	3
CENG 6130	Surf. & Colloid Phenomen	3
RCSE 6010	Water Resources Engineering I	3
PHYS 7060	Theoretical Mechanics	3
BMEN 6060	Biomedical Acoustics	3
BMEN 6310	Continuum Models In BMEN	3
BMEN 6630	Cell Mechanics	3
BMEN 6650	Biomechanics and Biotransport	3
BMEN 6790	Design Studio	3
BMEN 6970	TRIZ - Theory of Inventive Design	3

Commercialization and Policy Course Option: Students interested in technology entrepreneurship, commercialization, and policy may complete up to two of the following courses, or other similar courses with approval of the MCEN MS Advisor, to fulfill up to 6 credits towards the ME Master's degree.:

Course ID	Title	Credits
Commercialization and Policy Courses		
ENRG 7100	Energy Markets, Institutions & Policy	3
ENRG 7120	Energy Data Analysis	3
ENRG 7200	Energy Fundamentals & Trading	3
ENRG 7840	Energy Industry Projects	3
ENRG 7860	Renewable Energy Project Development & Finance	3
MGMT 6160	New Venture Planning	3
MGMT 7210	Management of Technology and Innovation	3
SCEN 6000	Entrepreneurship Eng & Biosci	3
BMEN 6080	Tech Invent & Commercialization	3

Math Option: Students may be interested in acquiring or enhancing mathematics skills by enrolling in courses offered by the Mathematics Department. MCEN MS students may take up to one graduate level MATH course at Tulane, with the approval of the MCEN MS Advisor, to fulfill up to 3 credits towards the ME Master's degree.:

Other current and future graduate-level SSE courses, including ones designated as EENS, RCSE, BMEN, CENG, CHEM, CMPS, ELEN, MCEN, MPEN, and PHYS, may be suitable electives for MCEN Master's students, with approval from the Advisory Committee.

Admission

No undergraduate major is specified for admission. Applicants must have completed at least 24 credit hours in science and engineering (3.0 GPA or higher). Adequate background coursework in mathematics, mechanics, dynamics, thermodynamics, and heat transfer is essential. Provisional admission with required remedial coursework is possible. Students who have not taken the requisite introductory course work will be required to pass such courses without credit towards the graduate degree to make up for this deficiency. Applicants who have not taken the requisite introductory coursework can be accepted if they have passed the Fundamentals of Engineering (FE) exam in mechanical engineering. Students must submit a transcript, a personal statement, at least one recommendation letter, and proof of proficiency in English (undergraduate degree from a program in which English was the language of instruction, TOEFL, or any equivalent standardized score).

For more information, go to our admissions page here: <https://sse.tulane.edu/academics/graduate/admissions> (<https://sse.tulane.edu/academics/graduate/admissions/>)

Tuition

For Tuition Rates » (<https://studentaccounts.tulane.edu/tuition-and-fees/>)

GPA Requirement

A GPA of 3.0 is required for the degree to be conferred. Courses receiving less than B- will contribute no credit toward the Master's degree requirements.

Apply

Please use the Online Application System (<https://applygrad.tulane.edu/apply/>) to apply for the program. The application deadlines are May 15th for Fall admission and November 15th for Spring admission.

Contacts

Please contact any of the following faculty if you have questions about the program.

- Prof. Matt Barrios (mbarrio4@tulane.edu)
- Prof. Ahmad Majed (aibrahim1@tulane.edu)
- Prof. Anoop Rajappan (arajappan@tulane.edu)

Mechanical Engineering (ME) Masters 4+1 Program

In addition to the above requirements:

- Tulane 4+1 students must have a minimum grade of B in Mechanics of Materials (ENGP 2430) and Thermodynamics (CENG 2120 or ENGP 2120) or equivalent.
- Tulane 4+1 students must have a letter of recommendation from a Tulane SSE faculty member.
- 4+1 students will normally indicate their intention to pursue the program before the end of the third year at Tulane and will complete between 6 and 12 credits of coursework towards the MS degree by the end of the fourth year.
- Six of these credits can count simultaneously towards the 120 credits required for the Bachelor's degree.

Program String and Field of Study: SEMS_GR, MCEN

Catalog addenda note: This program was added to the catalog on 6/13/2025.

Contact

For more information, contact the School of Science and Engineering (<https://sse.tulane.edu/academics/graduate/masters-programs/>).