Mechanical Engineering, PHD

Chairperson: John Borg, Ph.D., P.E.
Mechanical Engineering Graduate Programs website (https://www.marquette.edu/grad/programs-mechanical-engineering.php)

Degree Offered

Doctor of Philosophy

Mission Statement

We immerse individuals in an active environment to cultivate broadly educated mechanical engineers who balance theory with practice for advancing knowledge, solving problems and serving society.

Program Description

The Department of Mechanical Engineering offers two master's programs and a doctoral program. Course work and research in the department's programs may involve the broad fundamentals of mechanical engineering or may concentrate on one or more of the following fields: energy systems, manufacturing and materials systems, and mechanical systems. In these fields, engineering principles are applied not only to traditional equipment and methods but also to modern and emerging technologies. Typically, the engineering course work and research are augmented by laboratory studies. Although the study of advanced engineering mathematics and, often, basic science is necessary in all programs of study, the selection of subjects may vary depending upon the field of specialization and the student's professional objectives.

Mechanical Engineering Doctorate

Specializations: Energy Systems, Manufacturing and Materials Systems, Mechanical Systems

A doctoral student must complete a program of study prepared in collaboration with their permanent adviser. This program of study is outlined on an approved Doctoral Program Planning Form which must be submitted within the first year of the student's doctoral studies. The program requires the following:

- 48 credit hours of course work beyond the baccalaureate degree.
- 12 credit hours of dissertation work.
- At least 6 credit hours of an approved MEEN math course or equivalent. An equivalent math requirement from another department must be approved by the student's adviser and the director of graduate studies.
- Continuous participation in the department graduate seminar series (MEEN 6960 Seminar in Mechanical Engineering).
- At least one half of the total course work must be at the 6000 level.
- At least one-half of the total course work must be taken from the Department of Mechanical Engineering. No more than 24 credit hours may be taken outside the Department of Mechanical Engineering and these courses must be approved by the student's adviser and the director of graduate studies.
- Completion of all university Graduate School requirements.
- Full-time enrollment.
- A maximum of 3 credit hours of an Independent Study course may be included in the course work total.
- A maximum of 6 credit hours of graduate-level credit from other accredited institutions may be accepted toward the requirement of the degree as long as requirements are met, and prior approval must be received from the student's adviser and director of graduate studies.

In cases in which the student enters the program with a master's degree in mechanical engineering or a closely related field, the student may request (in writing) that the department and the Graduate School allow credits from the master's degree to satisfy up to 24 credit hours of the required course work.

A doctoral student must complete a departmental written proficiency exam prior to completion of the Marquette University doctoral residency requirement. This exam is comprised of two components. One component assesses proficiency in engineering mathematics and the other assesses proficiency in the student's declared area of specialization: energy systems, manufacturing and materials systems, or mechanical systems. This examination is based upon material presented in the advanced undergraduate and master's degree level course work (approved math courses are MEEN 6101 Advanced Engineering Analysis 1, MEEN 6102 Advanced Engineering Analysis 2, MEEN 6103 Approximate Methods in Engineering Analysis and EECE 6010 Advanced Engineering Mathematics).

A student must pass a doctoral qualifying examination (DQE) administered by their doctoral committee within one academic year after completing course work requirements. This exam must be passed at least one year prior to the submission and successful public defense of the dissertation. The dissertation must represent an original research contribution and demonstrate both high scholarly achievement and the ability to conduct independent research.

Specialization Requirements

Energy Systems

A specialization in energy systems typically entails advanced study of (a) thermodynamics, fluid mechanics, heat and mass transfer and combustion; (b) the application of these principles to phenomena and devices which constitute energy-conversion systems; and (c) the analysis, simulation and design of such systems as well as plants; e.g., chemical, metallurgical, food, etc., which are energy-intensive. Current research topics include: plant optimization, cogeneration systems, fluid mechanics and heat transfer in surface mount technology, engine emissions/process effluents and jet engine propulsion systems, energy dispersive materials, combustion and soot modeling.

Code	Title	Hours
Required math courses:		
MEEN 6101	Advanced Engineering Analysis 1	3
MEEN 6102	Advanced Engineering Analysis 2	3
or MEEN 6103	Approximate Methods in Engineering Analysis	
or EECE 6010	Advanced Engineering Mathematics	
Required specialization courses:		
MEEN 5325	Intermediate Fluid Mechanics	3
MEEN 5360	Intermediate Thermodynamics	3
Additional requirements:		
MEEN 6960	Seminar in Mechanical Engineering (taken every term)	0
MEEN 8999	Doctoral Dissertation	12
Additional course work chosen from the following:		36
MEEN 5260	Introduction to Continuum Mechanics	
MEEN 5265	Intermediate Finite Element Methods	
MEEN 5310	Combustion: Thermochemistry, Kinetics and Applications	
MEEN 5320	Internal Combustion Engines	
MEEN 5350	Transport Phenomena	
MEEN 5410	Experimental Design	
MEEN 5931	Topics in Mechanical Engineering	
MEEN 6102	Advanced Engineering Analysis 2	
MEEN 6103	Approximate Methods in Engineering Analysis	
MEEN 6260	Multiscale Material Modeling	
MEEN 6310	Advanced Fluid Mechanics	
MEEN 6320	Turbulence	
MEEN 6330	Statistical Thermodynamics	
MEEN 6340	Thermal Radiation Heat Transfer	
MEEN 6345	Multicomponent Mass Transfer	
MEEN 6350	Convective Heat and Mass Transfer	
MEEN 6360	Computational Fluid Mechanics	
MEEN 6365	Computational Methods in Heat Transfer and Fluid Flow	
MEEN 6370	Combustion Chemistry and Mechanisms	
MEEN 6375	Turbulent Combustion	
MEEN 6931	Topics in Mechanical Engineering	
MEEN 6995	Independent Study in Mechanical Engineering	
Additional courses as approved by adviser.		
Total Credit Hours:		**60**

Manufacturing and Materials Systems

A specialization in manufacturing and materials systems typically entails advanced study in (a) evaluation of materials and their behavior; (b) processes for changing material shape and properties; (c) approaches to economizing complex systems; (d) material-man-machine interfaces; and (e) analysis of the manufacturing process. Normally, each of these multi-disciplinary areas requires certain core courses along with specialized studies, which may include advanced courses in other engineering disciplines, courses in mathematics and statistics and/or courses in business administration. Current research topics include: cellular manufacturing, polishing and mass finishing processes, flexible assembly, robotic systems, production integration, ergonomics, reliability/quality estimation, human performance and safety evaluation, and materials forming and joining processes.

Code	Title	Hours
Required math courses:		
MEEN 6101	Advanced Engineering Analysis 1	3
MEEN 6102	Advanced Engineering Analysis 2	3
or MEEN 6103	Approximate Methods in Engineering Analysis	
or EECE 6010	Advanced Engineering Mathematics	
Required specialization courses:		
MEEN 5410	Experimental Design	3
MEEN 5450	Mechanical Behavior of Materials	3
Additional requirements:		
MEEN 6960	Seminar in Mechanical Engineering (taken every term)	0
MEEN 8999	Doctoral Dissertation	12
Additional course work chosen from the following:		36
MEEN 5220	Intermediate Dynamics	
MEEN 5245	Fatigue and Fracture Mechanics	
MEEN 5260	Introduction to Continuum Mechanics	
MEEN 5265	Intermediate Finite Element Methods	
MEEN 5275	Mechatronics	
MEEN 5420	Failure Analysis	
MEEN 5430	Powder Metallurgy	
MEEN 5440	Processing and Forming of Materials	
MEEN 5485	Welding Engineering	
MEEN 5931	Topics in Mechanical Engineering	
MEEN 6102	Advanced Engineering Analysis 2	
MEEN 6103	Approximate Methods in Engineering Analysis	
MEEN 6250	Industrial Robotics	
MEEN 6260	Multiscale Material Modeling	
MEEN 6366	Computational Methods for Solids and Structures	
MEEN 6470	Statistical Methods in Engineering	
MEEN 6473	Computer Integrated Manufacturing	
MEEN 6480	Metal Forming	
MEEN 6931	Topics in Mechanical Engineering	
MEEN 6995	Independent Study in Mechanical Engineering	
Additional courses as approved by adviser.		
Total Credit Hours:		**60**

Mechanical Systems

A specialization in mechanical systems typically entails advanced study of (a) mechanical system design and analysis; and (b) modeling, simulation and control. Mechanical design and analysis focuses on the use of physical and mathematical principles to understand the behavior of mechanical systems. It includes computer-aided optimal design, such as the design of multi-body, multi-degree-of-freedom mechanical systems. The modeling, simulation and control area involves the study of theoretical mechanics in conjunction with computational applications including advanced dynamics, kinematics and stress analysis. Other applications include the modeling and control of manufacturing processes, including robotics and automated deformation processing. Current research areas include: composite and polymeric materials, control in automated assembly, design of compliant mechanisms, metal cutting/forming mechanics, finite element methods and multiscale material modeling.

Code	Title	Hours
Required math courses:		
MEEN 6101	Advanced Engineering Analysis 1	3
MEEN 6102	Advanced Engineering Analysis 2	3
or MEEN 6103	Approximate Methods in Engineering Analysis	
or EECE 6010	Advanced Engineering Mathematics	
Required specialization courses:		
MEEN 5220	Intermediate Dynamics	3
MEEN 5230	Intermediate Mechanics of Materials	3

Additional requirements:		
MEEN 6960	Seminar in Mechanical Engineering (taken every term)	0
MEEN 8999	Doctoral Dissertation	12
Additional course work chosen from the following:		36
MEEN 5245	Fatigue and Fracture Mechanics	
MEEN 5260	Introduction to Continuum Mechanics	
MEEN 5265	Intermediate Finite Element Methods	
MEEN 5270	Physical Systems Modeling	
MEEN 5275	Mechatronics	
MEEN 5410	Experimental Design	
MEEN 5420	Failure Analysis	
MEEN 5450	Mechanical Behavior of Materials	
MEEN 5570	Biomaterials Science and Engineering	
MEEN 5931	Topics in Mechanical Engineering	
MEEN 6102	Advanced Engineering Analysis 2	
MEEN 6103	Approximate Methods in Engineering Analysis	
MEEN 6220	Advanced Dynamics	
MEEN 6225	Advanced Vibrations	
MEEN 6230	Advanced Mechanics of Materials	
MEEN 6250	Industrial Robotics	
MEEN 6260	Multiscale Material Modeling	
MEEN 6931	Topics in Mechanical Engineering	
MEEN 6995	Independent Study in Mechanical Engineering	
Additional courses as approved by adviser.		
Total Credit Hours:		**60**

Doctoral Learning Outcomes

1. Apply knowledge of advanced concepts (i.e., concepts beyond those learned during the master of science program) in engineering mathematics and two out of three areas of specializations offered in the department (mechanical systems, energy systems, manufacturing and materials systems).
2. Communicate ideas (specific to an area of specialization) via peer-reviewed, published and/or presented materials.
3. Conduct original research in a chosen area of specialization.

University Policies

- Academic Censure - Graduate School (https://bulletin.marquette.edu/policies/academic-censure/graduate/)
- Academic Integrity (https://bulletin.marquette.edu/policies/academic-integrity/)
- Academic Misconduct (https://bulletin.marquette.edu/policies/academic-misconduct-policy/)
- Academic Program Definitions (https://bulletin.marquette.edu/policies/academic-programs-defined/)
- Accelerated Degree Programs (https://bulletin.marquette.edu/policies/accelerated-degree-programs/)
- Attendance - Graduate School (https://bulletin.marquette.edu/policies/attendance/graduate/)
- Awarding Diplomas and Certificates (https://bulletin.marquette.edu/policies/awarding-diplomas-certificates/)
- Background Checks, Drug Testing (https://bulletin.marquette.edu/policies/background-checks-drug-testing/)
- Class Rank (https://bulletin.marquette.edu/policies/class-rank/)
- Commencement (https://bulletin.marquette.edu/policies/commencement/)
- Conferral of Degrees and Certificates (https://bulletin.marquette.edu/policies/conferral-degrees-certificates/)
- Course Levels (https://bulletin.marquette.edu/policies/course-levels/)
- Credit Hour (https://bulletin.marquette.edu/policies/credit/)
- Credit Load - Graduate School (https://bulletin.marquette.edu/policies/credit-load/graduate/)
- Faculty Grading (https://bulletin.marquette.edu/policies/faculty-grading/)
- Family Education Rights and Privacy Act-FERPA (https://bulletin.marquette.edu/policies/ferpa/)
- Grade Appeals (https://bulletin.marquette.edu/policies/grade-appeals/)
- Grading System - Graduate School and Graduate School of Management (https://bulletin.marquette.edu/policies/grading-system/graduate-management/)

- Graduation - Graduate School (https://bulletin.marquette.edu/policies/graduation/graduate/)
- Immunization and Tuberculosis Screening Requirements (https://bulletin.marquette.edu/policies/immunization-and-tuberculosis-screening/)
- Last Date of Attendance/Activity (https://bulletin.marquette.edu/policies/last-dateof-attendance-activity/)
- Military Call to Active Duty or Training (https://bulletin.marquette.edu/policies/militarycall-active-duty-training/)
- Registration - Graduate School (https://bulletin.marquette.edu/policies/registration/graduate/)
- Repeated Courses - Graduate School (https://bulletin.marquette.edu/policies/repeated-courses/graduate/)
- Student Data Use and Privacy (https://bulletin.marquette.edu/policies/student-data-use-privacy/)
- Transcripts-Official (https://bulletin.marquette.edu/policies/transcripts-official/)
- Transfer Course Credit - Graduate School (https://bulletin.marquette.edu/policies/transfer-course-credit-policy/graduate/)
- Withdrawal - Graduate School (https://bulletin.marquette.edu/policies/withdrawals/graduate/)

Graduate School Policies

- Academic Performance (https://bulletin.marquette.edu/graduate/policies/academic-performance/)
- Academic Programs Overview (https://bulletin.marquette.edu/graduate/policies/academic-programs-overview/)
- Advising (https://bulletin.marquette.edu/graduate/policies/advising/)
- Assistantships and Fellowships (https://bulletin.marquette.edu/graduate/policies/assistantships-andfellowships/)
- Certificate Concurrent Enrollment (https://bulletin.marquette.edu/graduate/policies/certificate-concurrent-enrollment/)
- Conduct (https://bulletin.marquette.edu/graduate/policies/conduct/)
- Confidentiality of Proprietary Information (https://bulletin.marquette.edu/graduate/policies/confidentiality-proprietary-information/)
- Continuous Enrollment (https://bulletin.marquette.edu/graduate/policies/continuous-enrollment/)
- Courses and Prerequisites (https://bulletin.marquette.edu/graduate/policies/courses-prerequisites/)
- Cross-listed Courses (https://bulletin.marquette.edu/graduate/policies/cross-listed-courses/)
- Deadlines (https://bulletin.marquette.edu/graduate/policies/deadlines/)
- Graduate Credit (https://bulletin.marquette.edu/graduate/policies/graduate-credit/)
- Graduate School Policies (https://bulletin.marquette.edu/graduate/policies/)
- Independent Study (https://bulletin.marquette.edu/graduate/policies/independent-study/)
- Intellectual Property (https://bulletin.marquette.edu/graduate/policies/intellectual-property/)
- Research Involving Humans, Animals, Radioisotopes or Recombinant DNA/Transgenic Organisms (https://bulletin.marquette.edu/graduate/policies/research-involving-humans-animals-radioisotopes-recombinant-dnatransgenic-organisms/)
- Temporary Withdrawal from Graduate Program (https://bulletin.marquette.edu/graduate/policies/temporary-withdrawal-graduate-program/)
- Time Limitations (https://bulletin.marquette.edu/graduate/policies/time-limitations/)
- Working with Minors (https://bulletin.marquette.edu/graduate/policies/working-minors/)

Mechanical Engineering Graduate Programs

- Mechanical Engineering, ME (https://bulletin.marquette.edu/graduate/mechanical-engineering-me/)
- Mechanical Engineering, MS (https://bulletin.marquette.edu/graduate/mechanical-engineering-ms/)
- Mechanical Engineering, PHD (p. 1)

MEEN 5220 Intermediate Dynamics (3 credits)
Develop an understanding of the principles of 3D rigid body kinematics (motion) and kinetics (forces and accelerations). Use these principles to analyze the dynamic behavior of mechanical systems. Learn to use analytical mechanics tools including virtual work and Lagrange's method. Develop a systematic approach for solving engineering problems.
Level of Study: Graduate
Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205220)

MEEN 5230 Intermediate Mechanics of Materials (3 credits)
Review of beam theory; asymmetric bending, shear center, thin-walled sections; torsion of non-circular sections, open and closed thin-walled sections; energy methods, Castigliano's second theorem, statically indeterminate structures, internal static indeterminacy; curved beams.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205230)

MEEN 5240 Polymers and Polymer Composites (3 credits)
Introduction to physical/chemical structure of polymers, polymer characterization, polymer material properties and mechanical testing methods, elastic and viscoelastic polymer response, processing methods, composite materials and the selection of polymers in design applications.
Level of Study: Graduate
Last four terms offered: 2018 Fall Term, 2010 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205240)

MEEN 5245 Fatigue and Fracture Mechanics (3 credits)
Application of fatigue and fracture models to engineering design. Stress-life (high-cycle), strain-life (low-cycle), and fatigue crack growth models for fatigue. Introduction to linear elastic fracture mechanics. Statistical considerations in failure. Fail-safe design practices. Includes illustrative case studies.
Level of Study: Graduate
Last four terms offered: 2014 Spring Term, 2013 Spring Term, 2012 Spring Term, 2011 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205245)

MEEN 5260 Introduction to Continuum Mechanics (3 credits)
Introduction to tensor notation, tensor analysis and coordinate system invariance; analysis of stress, strain and rate of strain for infinitesimal and finite deformation; application of Newtonian mechanics to deformable media; mechanical constitutive equations; field equations for solid and fluid mechanics.
Level of Study: Graduate
Last four terms offered: 2017 Fall Term, 2016 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205260)

MEEN 5265 Intermediate Finite Element Method (3 credits)
Introduces the finite element solution method for linear, static problems. Includes calculation of element stiffness matrices, assembly of global stiffness matrices, exposure to various finite element solution methods, and numerical integration. Emphasizes structural mechanics, and also discusses heat transfer and fluid mechanics applications in finite element analysis. Computer assignments include development of finite element code (FORTRAN or C) and also use of commercial finite element software (ANSYS and/or MARC).
Prerequisite: MEEN 3260 or equiv.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2018 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205265)

MEEN 5270 Physical Systems Modeling (3 credits)
Principles of modeling of physical systems, including devices and processes. Development of models of physical systems: mechanical, electrical, fluid, thermal and coupled systems. Time-dependent behavior of interconnected devices and processes. Computer-based modeling and simulation of physical systems. Identification using models and measured data. Introduction to control systems analysis and design.
Level of Study: Graduate
Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2018 Fall Term, 2009 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205270)

MEEN 5275 Mechatronics (3 credits)
Mechatronics, as an engineering discipline, is the synergistic combination of mechanical engineering, electronics, control engineering, and computer science, all integrated through the design process. This course covers mechatronic system design, modeling and analysis of dynamic systems, control sensors and actuators, analog and digital control electronics, interfacing sensors and actuators to a microcomputer/microcontroller, discrete and continuous controller design, and real-time programming for control.
Level of Study: Graduate
Last four terms offered: 2018 Fall Term, 2017 Fall Term, 2015 Fall Term, 2014 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205275)

MEEN 5310 Combustion: Thermochemistry, Kinetics and Applications (3 credits)
Fundamentals of combustion and chemical kinetics, with applications to engines and combustion devices. Study of fluid flow, thermodynamics, combustion, heat transfer and friction phenomena, and fuel properties relevant to engine power, efficiency and emissions. Examination of spark-ignition, diesel, stratified charge, HCCI, mixed-cycle and gas turbine engines.
Level of Study: Graduate
Last four terms offered: 2020 Fall Term, 2019 Fall Term, 2019 Spring Term, 2018 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205310)

MEEN 5320 Internal Combustion Engines (3 credits)
Fundamental aspects of the design and operating characteristics of spark-ignition and diesel engines. Presents an overview of the thermodynamics, combustion, fluid flow and heat transfer that takes place within the engine cylinder. Discusses efficiency and emissions challenges that the engine must meet.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205320)

MEEN 5325 Intermediate Fluid Mechanics (3 credits)
Intermediate Fluid Mechanics continues to develop fluid mechanic concepts, building on a working knowledge of the Reynolds Transport Theorem. Topics include: differential analysis, irrotational flow theory, boundary layer theory and compressible flow theory. Both laminar and turbulent flows are discussed. Some working knowledge of computer programming is necessary.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205325)

MEEN 5350 Transport Phenomena (3 credits)
Includes three closely related topics: fluid dynamics, mass transfer, and heat transfer. Fluid dynamics involves the transport of momentum, mass transfer is concerned with the transport of mass of various chemical species, and heat transfer deals with the transport of energy. In practice, rarely are these phenomena acting alone. Develops a more cohesive understanding of these interrelated processes.
Level of Study: Graduate
Last four terms offered: 2017 Fall Term, 2016 Fall Term, 2015 Fall Term, 2014 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205350)

MEEN 5360 Intermediate Thermodynamics (3 credits)
Covers fundamentals of thermodynamics, including classical and statistical approaches with application to equilibrium and non-equilibrium, non-reactive and reactive systems. May cover topics relevant to micro/nanoscale and biological systems.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205360)

MEEN 5370 Heat Exchangers Design and Analysis (3 credits)
Addresses the fundamental thermal-hydraulic equations and correlations used to design and analyze various types of heat exchangers. A systematic approach/method to the thermal-hydraulic design and analysis, or rating, of various types of heat exchanger systems through selected virtual and real problems.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205370)

MEEN 5380 Renewable Energy - Fundamentals and Applications (3 credits)
Emphasis on thermodynamics, heat transfer and fluid mechanics aspects of renewable energy systems and applications. Topics include solar, wind, hydropower, geothermal, biomass, and wave and tide. Both technical and economic analyses of renewable energy systems.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205380)

MEEN 5410 Experimental Design (3 credits)
Application of statistical concepts to design engineering experiments to improve quality, production techniques, and reliability. Use and advantages of various models; factorial, fractional factorial, orthogonal arrays and fractional designs.
Level of Study: Graduate
Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2020 Spring Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205410)

MEEN 5420 Failure Analysis (3 credits)
Methodology of failure analysis. Studies of brittle fracture, ductile fracture, fatigue, stress corrosion and electro-chemical corrosion as applied to the failure of metals. Involves some laboratory work and analyses of a variety of metallurgical failures.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205420)

MEEN 5430 Powder Metallurgy (3 credits)
Introduces a modern technology with growing importance. Covers the basics of powder metallurgy with main emphasis on sintered steel. The primary topics covered are powder production, die compacting, sintering theory and practice, full density processing, properties under static and dynamic loading conditions.
Level of Study: Graduate
Last four terms offered: 2017 Fall Term, 2015 Fall Term, 2013 Fall Term, 2012 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205430)

MEEN 5440 Processing and Forming of Materials (3 credits)
Solidification and microstructural development in metal casting with an overview of selected melting processes. Overview of primary and secondary working principles involved in ferrous materials processing. Stress based and finite element analyses are applied to both sheet and bulk forming to develop a fundamental understanding of deformation processing principles and technology associated with processes such as drawing, open and closed die forging and rolling.
Level of Study: Graduate
Last four terms offered: 2022 Spring Term, 2020 Fall Term, 2019 Fall Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205440)

MEEN 5450 Mechanical Behavior of Materials (3 credits)
Stress and strain relationships for elastic behavior. Theory of plasticity. Plastic deformation of single crystals and polycrystalline aggregates. Dislocation theory, fracture, internal friction, creep and stress rupture and brittle failure.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2020 Fall Term, 2019 Fall Term, 2019 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205450)

MEEN 5470 Computer Integrated Production Systems (3 credits)
Overview of computer integrated production systems, which include computer numerical control, industrial robotics, material transport and storage systems, automated production lines, flexible manufacturing systems, quality control systems, CAD/CAM, production planning and control, just-in-time and lean manufacturing.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205470)

MEEN 5475 Ergonomics (3 credits)
Ergonomics maximizes the health and safety of workers, while maintaining productivity and quality. Covers biomechanical and physiologic aspects of workplace design, such as engineering anthropometry, cumulative trauma disorders, (including carpal tunnel syndrome), low back injuries, hand tool design and evaluation, methods of surveillance in industrial environments, modeling, and ergonomics guidelines. Laboratory experiences are offered to demonstrate ergonomic principles and also provide students with hands-on experience in collecting data and conducting experiments.
Level of Study: Graduate
Last four terms offered: 2020 Fall Term, 2018 Fall Term, 2017 Spring Term, 2016 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205475)

MEEN 5485 Welding Engineering (3 credits)
Arc welding physics, fundamentals of power supplies and welding circuits, fusion and solid-state welding processes, weld testing, analysis of welded joints, demonstrations using various processes.
Level of Study: Graduate
Last four terms offered: 2013 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205485)

MEEN 5570 Biomaterials Science and Engineering (3 credits)
Designed to introduce the uses of materials in the human body for the purposes of healing, correcting deformities and restoring lost function. The science aspect of the course encompasses topics including: characterization of material properties, biocompatibility and past and current uses of materials for novel devices that are both biocompatible and functional for the life of the implanted device. Projects allow students to focus and gain knowledge in an area of biomaterials engineering in which they are interested. Same as BIEN 4420.
Level of Study: Graduate
Last four terms offered: 2020 Spring Term, 2019 Spring Term, 2018 Spring Term, 2016 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205570)

MEEN 5931 Topics in Mechanical Engineering (3 credits)
Topics may include energy conversion, mechanical analysis and design, and manufacturing systems.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%205931)

MEEN 6101 Advanced Engineering Analysis 1 (3 credits)
Various types of (first and high-order) homogeneous ordinary differential equations using proper methods and techniques: integral method, Green's function, Laplace transform technique, Frobenius series solution method. Boundary value problems (BVPs) with using orthogonality property and Fourier series. Introduction to partial differential equations- the method of separation of variable. Emphasizes applications to real engineering problems.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Fall Term, 2021 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206101)

MEEN 6102 Advanced Engineering Analysis 2 (3 credits)
Vectors, matrices/tensors and linear algebra. Vector calculus with various integral theorems. Functions of complex variable and integration theorem in complex plane. Special topics in complex variable functions: integration in complex plane, complex series and residue theorem and conformal mappings. Emphasizes applications to real engineering problems.
Level of Study: Graduate
Last four terms offered: 2017 Spring Term, 2010 Fall Term, 2009 Spring Term, 2006 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206102)

MEEN 6103 Approximate Methods in Engineering Analysis (3 credits)
Treatment of approximate methods for solving various problems in engineering. Matrix methods, variational methods (e.g., Ritz, Galerkin, etc.), finite difference methods, finite element method.
Level of Study: Graduate
Last four terms offered: 2013 Fall Term, 2012 Fall Term, 2011 Spring Term, 2010 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206103)

MEEN 6220 Advanced Dynamics (3 credits)
Kinematics of particles and rigid bodies. Basic principles of vector mechanics. Variational principles. Basic principles of analytical mechanics.
Prerequisite: MEEN 4220/5220 or equiv.
Level of Study: Graduate
Last four terms offered: 2019 Spring Term, 2018 Spring Term, 2017 Spring Term, 2015 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206220)

MEEN 6225 Advanced Vibrations (3 credits)
Theory of vibration with applications. Natural modes of vibration for lumped parameter systems. Response of lumped systems with damping. Response of distributed parameter system including bars, beams, etc.
Level of Study: Graduate
Last four terms offered: 2021 Fall Term, 2020 Fall Term, 2018 Fall Term, 2017 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206225)

MEEN 6230 Advanced Mechanics of Materials (3 credits)
Thick wall cylinders, rotating disks, initial stresses; stress concentration factors, cracks, discontinuity stresses; autofrettage, residual stresses; beams on elastic foundation, introduction to plates and shells, pressure vessel analysis.
Prerequisite: MEEN 5230; or MEEN 5250.
Level of Study: Graduate
Last four terms offered: 2019 Spring Term, 2018 Spring Term, 2016 Spring Term, 2015 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206230)

MEEN 6240 Composite Materials (3 credits)
Introduction to fiber/matrix materials systems with emphasis on continuous fiber-reinforced composites. Principles of anisotropic elasticity, classical lamination theory, and viscoelasticity. Analysis of mechanical, thermal, hygroscopic and combination loading of laminated composites. Review of manufacture/fabrication methods for advanced composites, consolidation techniques, and basic issues in the design of advanced composites.
Prerequisite: MEEN 5240; or cons. of instr.
Level of Study: Graduate
Last four terms offered: 2016 Fall Term, 2014 Fall Term, 2012 Spring Term, 2009 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206240)

MEEN 6250 Industrial Robotics (3 credits)
Fundamentals of industrial robotic systems. Covers serial and parallel manipulators, forward and inverse kinematics, differential kinematics, multi-rigid-body dynamics, trajectory planning, linear control theory, actuators and sensors, mechanism design and vision systems.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2019 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206250)

MEEN 6260 Multiscale Material Modeling (3 credits)
Numerical and analytical techniques for modeling the micromechanics and micro-structural evolution of complex heterogeneous materials (including granular, composite, and atomic/molecular materials); techniques for transferring information between local (micro-scale) and global (macro-scale) representations of multi-scale materials., and MEEN 4260 or MEEN 5260 or equiv.
Prerequisite: MEEN 3260 or equiv.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206260)

MEEN 6310 Advanced Fluid Mechanics (3 credits)
Further development of fluid flow theory starting with classic potential flow solutions. Numerical and analytical techniques for both inviscid and viscid fluid flows, including boundary layer theory and stability. Transition routes and chaos with an introduction to turbulence.; computer programming experience recommended.
Prerequisite: MEEN 5325 or MEEN 5350 or equiv.
Level of Study: Graduate
Last four terms offered: 2016 Spring Term, 2014 Fall Term, 2013 Fall Term, 2012 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206310)

MEEN 6320 Turbulence (3 credits)
Advanced physical and mathematical description of fluid flow systems, including the fundamentals of turbulence motion. The development of the Reynolds stress equations, processes that govern dissipation and statistical description of scales. Includes the modeling techniques associated with turbulent velocity profiles as well as the development of zero, one and two equation closure models.; computer programming experience recommended.
Prerequisite: MEEN 5350 or equiv.
Level of Study: Graduate
Last four terms offered: 2017 Spring Term, 2009 Spring Term, 2007 Spring Term, 2001 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206320)

MEEN 6330 Statistical Thermodynamics (3 credits)
Fundamentals and Applications of Statistical Thermodynamics. Properties in the dilute limit and beyond. Quantum mechanics, spectroscopy, and spectroscopic measurement techniques. Kinetic theory and chemical kinetics.
Level of Study: Graduate
Last four terms offered: 2013 Spring Term, 2011 Fall Term, 2010 Spring Term, 2008 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206330)

MEEN 6340 Thermal Radiation Heat Transfer (3 credits)
Blackbody radiation characteristics. Non-black surface properties: emissivity, absorptivity and reflectivity and values for real materials. Blackbody radiation exchange and viewfactor algebra. Graybody exchange. Effects of non-diffuse, non-gray surface properties. Absorption-emission-scattering during transmission through media: transfer equation and approximate solutions. Emphasis on terrestrial solar and building thermal envelope through examples.
Level of Study: Graduate
Last four terms offered: 2019 Fall Term, 2017 Fall Term, 2016 Fall Term, 2007 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206340)

MEEN 6345 Multicomponent Mass Transfer (3 credits)
Fundamentals of Multicomponent Mass Transfer, including Maxwell-Stefan diffusion, Generalized Fick's Law, ideal and non-ideal mixtures, interphase mass transfer and film theory and multicomponent mass transfer in porous media.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206345)

MEEN 6350 Convective Heat and Mass Transfer (3 credits)
Principles and mechanisms of convective transports of energy and of chemical species associated with laminar and turbulent flows, including condensation and boiling. Calculation of heat and mass transport coefficients. Mathematical modeling, with applications to engineering devices involving several of these processes, with and without phenomenological coupling.
Prerequisite: MEEN 6310.
Level of Study: Graduate
Last four terms offered: 2022 Spring Term, 2019 Spring Term, 2008 Fall Term, 2006 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206350)

MEEN 6360 Computational Fluid Mechanics (3 credits)
Review of the fundamental thermofluids science, mathematical and computational principles underlying modern CFD software. Utilization of software for representative applications. Individual student project devoted to a new application.
Prerequisite: MEEN 6101 and MEEN 6320; or cons. of instr.
Level of Study: Graduate
Last four terms offered: 2010 Spring Term, 1999 Fall Term, 1998 Fall Term, 1997 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206360)

MEEN 6365 Computational Methods in Heat Transfer and Fluid Flow (3 credits)
Basics of scientific computing. Classification of differential equations. Finite difference and finite volume methods. Direct and iterative solvers. Verification and validation. Implicit and explicit methods. Stability and convergence. Solution of heat diffusion equation, advection-diffusion equation and fluid flow. Basics of CFD. Knowledge of computer programming.
Prerequisite: Intermediate knowledge of heat transfer and fluid flow.
Level of Study: Graduate
Last four terms offered: 2022 Fall Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206365)

MEEN 6366 Computational Methods for Solids and Structures (3 credits)
A theoretical development of the finite element method for analysis of solids and structures with geometric and materials nonlinearities. Topics include the formulation of both Updated and Total Lagrangian 3D finite elements, solutions to quasi-static and time-dependent solid mechanics problems, non-linear materials modeling, solution methods, and stability issues often encountered in complex finite element analysis. Reviews linear elastic finite element theory and non-linear continuum mechanics. Emphasizes programming of the finite element method.
Level of Study: Graduate
Last four terms offered: 2022 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206366)

MEEN 6370 Combustion Chemistry and Mechanisms (3 credits)
Advanced theoretical, experimental and numerical techniques for studying the chemistry and kinetic mechanisms of combustion. The technical content for includes theories of gas phase chemical kinetics, a discussion of experimental and theoretical techniques for evaluating kinetic rate coefficients, and strategies for the development and reduction of kinetic mechanisms intended for modeling combustion reactions. Topics relevant to statistical thermodynamics and the physical dynamics of technical flames may be covered.
Prerequisite: MEEN 4310 or MEEN 5310 or equiv.
Level of Study: Graduate
Last four terms offered: 2017 Spring Term, 2016 Spring Term, 2007 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206370)

MEEN 6375 Turbulent Combustion (3 credits)
Fundamentals of turbulence, turbulence modeling and RANS. Fundamentals of combustion and chemical kinetics. Turbulent premixed and non-premixed combustion. Closure models for turbulent combustion such a Flamelet models, EDC models and PDF models. Applications of turbulent combustion modeling.
Level of Study: Graduate
Last four terms offered: 2021 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206375)

MEEN 6470 Statistical Methods in Engineering (3 credits)
Development of statistical models in engineering and statistical analysis of data. Statistical concepts. Inference methods. Application of statistical models to component reliability and probability design. Probability plotting; Monte Carlo simulation.
Level of Study: Graduate
Last four terms offered: 2006 Spring Term, 2004 Spring Term, 2002 Spring Term, 1986 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206470)

MEEN 6473 Computer Integrated Manufacturing (3 credits)
Primary objectives include the validation of the underlying philosophy behind computer integrated manufacturing and the definition of characteristics of various components which constitute a C.I.M. environment. Describes the benefits of C.I.M. and how to upgrade conventional plants to a C.I.M. operation.
Level of Study: Graduate
Last four terms offered: 2017 Spring Term, 2016 Spring Term, 2014 Spring Term, 2008 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206473)

MEEN 6475 Advanced Ergonomics/Human Factors Engineering (3 credits)
Fundamentals of ergonomics/human factors engineering (HFE) with emphasis on the application of basic principles to advances in engineering applications, research, and development. Topics include: engineering anthropometry, cumulative trauma disorders, low back disorders, electromyography, biomechanical modeling, and ergonomic guidelines. Requires research papers in the above areas or in a related ergonomics/HFE field.
Prerequisite: Cons. of instr.
Level of Study: Graduate
Last four terms offered: 2015 Spring Term, 2010 Fall Term, 2008 Fall Term, 2006 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206475)

MEEN 6480 Metal Forming (3 credits)
Elements of von Mises plasticity theory-stress and deformation states, constitutive equations, and flow rules; plane and axisymmetric behavior. Solution techniques - exact, slipline theory, upper and lower bounds, finite bending, deep drawing.; or cons. of instr.
Prerequisite: MEEN 5440 or equiv.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2020 Fall Term, 2015 Fall Term, 2013 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206480)

MEEN 6931 Topics in Mechanical Engineering (3 credits)
Topics may include thermofluid science, mechanical analysis and design, and manufacturing systems.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2020 Spring Term, 2019 Fall Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206931)

MEEN 6960 Seminar in Mechanical Engineering (0 credits)
Scholarly presentations on current topics in mechanical engineering and related areas by visiting and resident investigators. Required of all full-time graduate students. SNC/UNC grade assessment.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206960)

MEEN 6995 Independent Study in Mechanical Engineering (1-3 credits)
Faculty-supervised, independent study/research of a specific area or topic in Mechanical Engineering.
Prerequisite: Cons. of instr. and cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206995)

MEEN 6999 Master's Thesis (1-6 credits)
S/U grade assessment.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%206999)

MEEN 8986 Cooperative Education in Mechanical Engineering (1-3 credits)
Offers an additional educational experience for graduate students in mechanical engineering, intended to increase student professional development and growth as an independent engineer and/or researcher. Provides the opportunity to work on-site with engineers from industry.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%208986)

MEEN 8999 Doctoral Dissertation (1-12 credits)
S/U grade assessment.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%208999)

MEEN 9970 Graduate Standing Continuation: Less than Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Designated as less than half-time status only, cannot be used in conjunction with other courses, and does not qualify students for financial aid or loan deferment.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2019 Spring Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209970)

MEEN 9974 Graduate Fellowship: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2021 Spring Term, 2020 Spring Term, 2018 Summer Term, 2013 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209974)

MEEN 9975 Graduate Assistant Teaching: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2018 Spring Term, 2017 Fall Term, 2017 Spring Term, 2016 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209975)

MEEN 9976 Graduate Assistant Research: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2021 Fall Term, 2021 Spring Term, 2020 Fall Term, 2020 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209976)

MEEN 9984 Master's Comprehensive Examination Preparation: Less than Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their master's comprehensive exam.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209984)

MEEN 9985 Master's Comprehensive Examination Preparation: Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209985)

MEEN 9986 Master's Comprehensive Examination Preparation: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2016 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209986)

MEEN 9987 Doctoral Qualifying Examination Preparation: Less than Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their doctoral qualifying exam.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209987)

MEEN 9988 Doctoral Qualifying Examination Preparation: Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209988)

MEEN 9989 Doctoral Qualifying Examination Preparation: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209989)

MEEN 9994 Master's Thesis Continuation: Less than Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Summer Term, 2021 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209994)

MEEN 9995 Master's Thesis Continuation: Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Fall Term, 2022 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209995)

MEEN 9996 Master's Thesis Continuation: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Fall Term, 2022 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209996)

MEEN 9997 Doctoral Dissertation Continuation: Less than Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2021 Spring Term, 2020 Fall Term, 2019 Spring Term, 2018 Fall Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209997)

MEEN 9998 Doctoral Dissertation Continuation: Half-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2018 Summer Term, 2015 Spring Term, 2014 Fall Term, 2013 Summer Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209998)

MEEN 9999 Doctoral Dissertation Continuation: Full-Time (0 credits)
Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.
Prerequisite: Cons. of dept. ch.
Level of Study: Graduate
Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Fall Term, 2022 Spring Term
Schedule of Classes (https://bulletin.marquette.edu/class-search/?details&code=MEEN%209999)