MECHANICAL ENGINEERING (MENG), BACHELOR OF SCIENCE

At Dunwoody College of Technology, the Mechanical Engineering bachelor's degree prepares students to enter the field of engineering ready to be a productive member of an engineering team from day one. Graduates can find employment in a variety of industries, including product design, research and development, heating ventilation and air conditioning (HVAC), consulting engineering, medical devices, and manufacturing.

Students learn how to apply engineering principles to mechanical design and to the design of thermal and fluid systems. Students also learn to work collaboratively in a team environment and use software tools current in the field. The curriculum is project-based so that theoretical engineering principles are reinforced and experienced through hands-on creation and problem-solving. Arts & Sciences courses help students understand the core mathematical and scientific principles that are the foundation of engineering theory, and provide students with the communication and critical thinking skills required to succeed in the profession.

All students complete a two-semester senior design project, working with advisors from local industry on real-world engineering projects. Graduates are prepared to pass the Fundamentals of Engineering Exam, the first step in becoming a licensed professional engineer (PE).

Credential Earned: BS
Length of Program: 4 years (8 semesters)
Classes Offered: Day
Available Starts: Fall Semester

Program Outcomes

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements

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<tr>
<th>Code</th>
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<th>Credits</th>
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<tr>
<td>CHEM2110</td>
<td>Chemistry with Lab</td>
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<tr>
<td>ENGL1010</td>
<td>English</td>
<td>3</td>
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<td>MATH1811</td>
<td>Calculus I</td>
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<tr>
<td>MATH1821</td>
<td>Calculus II</td>
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<tr>
<td>MATH2260</td>
<td>Probability &amp; Statistics</td>
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<td>MATH2810</td>
<td>Multi-Variable Calculus</td>
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<tr>
<td>MATH2820</td>
<td>Linear Algebra &amp; Differential Equations</td>
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<td>PHYS1800</td>
<td>Physics I with Lab</td>
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<td>Physics II with Lab</td>
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<td>Upper Humanities</td>
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Technical Requirements

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<tr>
<td>MENG1110</td>
<td>Engineering Drawings &amp; 3D Design</td>
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<td>MENG1120</td>
<td>Introduction to Engineering</td>
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<td>Machining for Engineers Lab</td>
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<td>MENG1230</td>
<td>Statics</td>
<td>3</td>
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<td>MENG2110</td>
<td>Introduction to Programming</td>
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<td>Electrical &amp; Controls Engineering Lab</td>
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<td>MENG2230</td>
<td>Dynamics</td>
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<td>MENG2240</td>
<td>Mechanics of Materials</td>
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<td>MENG3110</td>
<td>Dsgn for Manufacturability &amp; CAD/CAM Lab</td>
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<td>MENG3120</td>
<td>Design for Manufacturability &amp; CAD/CAM</td>
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<td>MENG3130</td>
<td>Introduction to Thermodynamics</td>
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<td>MENG3140</td>
<td>Materials Science</td>
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<td>MENG3240</td>
<td>Failure Analysis &amp; Design</td>
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<td>MENG3250</td>
<td>Introduction to Heat Transfer</td>
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<td>MENG4110</td>
<td>Transmission of Power Lab</td>
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<td>MENG4120</td>
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<td>MENG4130</td>
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<td>MENG4140</td>
<td>Senior Design I</td>
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<td>MENG4150</td>
<td>Principles of Quality &amp; Lean Mfg</td>
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<td>MENG4210</td>
<td>Heat Transfer Applications &amp; HVACR Lab</td>
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<td>MENG4251</td>
<td>Engineering Ethics</td>
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<td>MENG4260</td>
<td>Design of Experiments</td>
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Total Credits 126
Courses

Descriptions

MENG1110 | Engineering Drawings & 3D Design | Lecture (4 Credits)
Create 3D solid models and assemblies using SolidWorks. Interpret engineering prints; create detail and assembly drawings according to standards. Use freehand drawing as a graphical communication tool.

MENG1120 | Introduction to Engineering | Lecture (3 Credits)
Explore major topics in Engineering. Provides students with a pathway to success in the program, including time management, industry software, study skills, internship availability and career opportunities.

MENG1210 | Machining for Engineers Lab | Laboratory (2 Credits)
Employ metalworking techniques using typical shop equipment including mills, lathes, grinders, saws, and drills. Utilize hand tools to prep stock and finish edges.
Corequisite(s): MENG1220

MENG1220 | Machining for Engineers | Lecture (2 Credits)
Use theory and understanding of machining operations to plan work to create parts efficiently.
Corequisite(s): MENG1210

MENG1230 | Statics | Lecture (3 Credits)
Identification, recognition and calculations associated with forces acting on rigid bodies at rest. Use vector analysis to analyze concurrent forces, non-concurrent forces, friction forces, centroids and moments.
Prerequisite(s): MATH1810 Or MATH1811

MENG2110 | Introduction to Programming | Lecture (3 Credits)
Create programs to solve engineering problems. Apply modular design approaches, decision and loop structures, and object-oriented methods to write clear and efficient code for mechanical engineering applications.

MENG2210 | Electrical & Controls Engineering Lab | Laboratory (2 Credits)
Apply electrical and electronic controls to solve real-world problems. Topics include AC and DC motors, electronic sensors, programmable logic controllers, motor drives and human machine interfaces.
Prerequisite(s): PHYS1820
Corequisite(s): MENG2220

MENG2220 | Electrical & Controls Engineering | Lecture (2 Credits)
Identification, recognition and calculations associated with electrical and electronic controls. Topics include AC and DC motors calculations, wiring diagrams, Ohm's Law, series and parallel circuits, electronic sensors, programmable logic controllers, motor drives and human machine interfaces.
Prerequisite(s): PHYS1820
Corequisite(s): MENG2210

MENG2230 | Dynamics | Lecture (3 Credits)
Theory and calculations associated with kinematics and kinetics of particles, systems of particles and rigid bodies. Analyze the application of Newton's laws to the planar motion of rigid bodies.
Prerequisite(s): MENG1230

MENG2240 | Mechanics of Materials | Lecture (3 Credits)
Discover how materials behave under load including deformation under various loading profiles. Apply concepts to design of mechanical members such as a beams, shafts, columns, and other load bearing devices.
Prerequisite(s): MENG1230

MENG3110 | Dsgn for Manufacturability & CAD/CAM Lab | Laboratory (1 Credit)
Use CAD/CAM software to create part geometries, tool paths, machining parameters and post processes NC code. Design and create parts using other common manufacturing processes, such as casting, injection molding, and sheet metal forming processes.
Prerequisite(s): MENG1210
Corequisite(s): MENG3120

MENG3120 | Design for Manufacturability & CAD/CAM | Lecture (2 Credits)
Introduction to common manufacturing processes, with emphasis on the principles of design for each process. Processes include: sheet metal forming, casting, welding, and plastic fabrication.
Prerequisite(s): MENG1220 And MENG1210
Corequisite(s): MENG3110

MENG3130 | Introduction to Thermodynamics | Lecture (4 Credits)
Theory and calculations associated with the principles of thermal energy as well applications of the first and second laws of thermodynamics. Topics include work and heat, control volume, steady states, uniform states, entropy, availability, power and refrigeration.
Prerequisite(s): MATH2820 And PHYS1800

MENG3140 | Materials Science | Lecture (3 Credits)
Identify different types of materials, their properties, and appropriate uses. Processes that change material properties include: alloy composition, heat treatment, coatings, and other modifications.
Prerequisite(s): MENG1220 And CHEM2110

MENG3210 | GD&T & Measurements Lab | Laboratory (2 Credits)
Use lab metrology equipment to assess the geometric dimensions and tolerances of parts, and to perform other mechanical measurements such as temperature, pressure, and flow.
Prerequisite(s): MENG3130 And MATH2260
Corequisite(s): MENG3220

MENG3220 | GD&T & Measurements | Lecture (2 Credits)
Apply principles of physical measurements and error analysis to evaluate mechanical measurements. Create prints that include callouts for standards of accuracy using ASME/ANSI geometric dimensioning and tolerance standards.
Prerequisite(s): MDES1110 Or MENG1110
Corequisite(s): MENG3210

MENG3230 | Fluid Mechanics | Lecture (3 Credits)
Introduction to fluid statics and mechanics; laminar and turbulent flow with associated calculations. Applications to industry are used in problems.
Prerequisite(s): MATH2820

MENG3240 | Failure Analysis & Design | Lecture (2 Credits)
Examine advanced topics in modeling, design and best practices for machines, tooling and system assemblies. Evaluate components for protection against failure from low cycle fatigue, high cycle fatigue, ductile overload, corrosion.
Prerequisite(s): MENG2240

MENG3250 | Introduction to Heat Transfer | Lecture (3 Credits)
Examine the fundamentals of heat transfer modes including conduction, convection, and radiation. Calculations for each mode are included.
Prerequisite(s): MATH2820 And MENG3130
MENG4110 | Transmission of Power Lab | Laboratory (2 Credits)
Assemble and test mechanical power transmission systems, including
bearings, gears, linkages, shafts, and cams.
Prerequisite(s): MENG4120

MENG4120 | Transmission of Power | Lecture (2 Credits)
Apply principles of mechanical design and material failure to the design
and analysis of mechanical power transmission components, such as
gears, linkages, shafts, bearings, and cams.
Prerequisite(s): MATH2820 And MENG3240
Corequisite(s): MENG4110

MENG4130 | Finite Element Analysis | Lecture (3 Credits)
Finite element modeling using both manual and software simulation
analysis. Topics include two- and three-dimensional elements along with
applications in solid mechanics, heat transfer, and fluid mechanics.
Prerequisite(s): MATH2820

MENG4140 | Senior Design I | Capstone (4 Credits)
Student design teams execute a two semester design project to solve
a real-world problem. Application of the design process, underlying
sciences, and application of concepts and tools gained in the curriculum
are necessary. Application of project management principles and tools.
Prerequisite(s): MATH2820

MATH1811 | Calculus I | Lecture (4 Credits)
The fundamental tool used by engineers and scientists to determine
critical measurements, such as the area under curves, the volumes
within complex geometries, and for describing functions as an infinite
series. Computer software enables the application of the definite integral,
the fundamental theorem of calculus, applications of integration, and
numerical methods of integration.
Prerequisite(s): MATH1810 Or MATH1821
General Education: Mathematics

PHYS1800 | Physics I with Lab | Lec/Lab (4 Credits)
Introduction to mechanics using differential calculus as a foundation.
Topics include kinematics and dynamics of linear motion, static
equilibrium, the conservation of energy and momentum, mechanics
of solids and fluids, and thermodynamics. The laboratory portion
incorporates experimentation, instrumentation, and graphical tools to
verify calculations in motion, mechanics, and thermodynamics.
Prerequisite(s): MATH1810 Or MATH1821
General Education: Physical Sciences with Lab

PHYS1820 | Physics II with Lab | Lec/Lab (4 Credits)
An introductory calculus-based course in electromagnetic fields and their
applications. Topics include: Coulomb’s and Gauss’s Law, electric fields
and potentials, electrical and magnetic properties of matter, Ampere’s and
Faraday’s laws, elementary DC and AC circuits, Maxwell’s equations, and
electromagnetic waves.
Prerequisite(s): MATH1820, MATH1821, Or PHYS1800
General Education: Physical Sciences with Lab

ENGL1010 | English | Lecture (3 Credits)
Analyze the research and essay-writing process for purpose, planning,
drafting, and revision. Explore writing patterns and thought development.
Incorporate concepts of grammar and usage, documentation, source
relevancy and credibility. Focus is on clear, concrete writing.
General Education: Communications

MATH2820 | Linear Algebra & Differential Equations | Lecture (4 Credits)
An introduction to Linear Algebra, including vector spaces and linear
mappings between such spaces. Explore solution methods for ordinary
differential equations, qualitative techniques; includes matrix methods
approach to systems of linear equations and series solutions.
Prerequisite(s): MATH1821 Or MATH1820
General Education: Mathematics
MATH2260 | Probability & Statistics | Lecture (4 Credits)
Introduction to probability and statistics with applications. Topics include: basic combinatorics, random variables, probability distributions, hypothesis testing, confidence intervals, and linear regression.
Prerequisite(s): MATH1820 Or MATH1821
General Education: Mathematics

WRIT2010 | Technical Writing | Lecture (3 Credits)
Technical writing applications are studied for format, style, voice, and point of view; considered for purpose, audience, and subject. Critical thinking and developed expertise are employed to analyze, interpret, evaluate, summarize and generate various technical documents, individually and within teams.
General Education: Communications