

M.S. in Mechanical Engineering

The Master of Science in Mechanical Engineering (MSME) focuses on the advanced study of mechanical systems, enabling graduates to tackle critical challenges in energy, transportation, automation and bio-mechanical systems. This graduate program emphasizes hands-on learning, applied research and collaboration with experienced faculty who have industry backgrounds.

The Master of Science in Mechanical Engineering, housed in the Department of Mechanical Engineering at the **Daytona Beach Campus**, gives students the choice of a broad concentration (General Mechanical Engineering) or one of three specific areas of concentration: High-Performance Vehicles, Robotics and Autonomous Systems, or Thermal-Fluid Sciences. Students choose a thesis or non-thesis track while taking core courses that balance theory and the practical application of electromechanical systems. Research activities are supervised by experienced faculty in state-of-the-art labs, providing ample opportunities for professional growth.

Program-Level Student Learning Outcomes

Students will:

- Apply fundamental mechanical engineering professional practices to analyze, design, and implement mechanical engineering systems.
- Apply professional communication and oral presentation skills using appropriate media.
- Apply an ethical and professional framework to decision making.
- Apply knowledge of advanced topics in mechanical engineering.
- Analyze and interpret appropriate research literature.

Daytona Beach Program Requirements

Option	9-12
Area of Concentration	12-15
Electives	6
Total Credits	30

Non-Thesis Option

MECH 501	Modeling Methods in Mechanical Engineering	3
ENGR 600	Research Methods for Engineers	3
MECH 592	Mechanical Engineering Practicum	3
Area of Concentration		15
General Electives		6
Total Credits		30

Thesis Option

MECH 501	Modeling Methods in Mechanical Engineering	3
ENGR 600	Research Methods for Engineers	3
or MECH 700	Graduate Thesis	
MECH 700	Graduate Thesis	6
Area of Concentration		12
General Electives		6
Total Credits		30

Graduate Research Project Option

MECH 501	Modeling Methods in Mechanical Engineering	3
ENGR 600	Research Methods for Engineers	3
MECH 690	Graduate Research Project I	3
MECH 691	Graduate Research Project II	3

Area of Concentration	12
General Electives	6
Total Credits	30

Area of Concentration

Thesis and GRP students are required to complete 12 credit hours in one of the Areas of Concentration listed below. Non-Thesis students are required to complete 15 credit hours in one of the Areas of Concentration below.

High-Performance Vehicles

AERO 515	Introduction to the Finite Element Method	3
ELEC 505	Advanced Mechatronics	3
MECH 503	Introduction to Autonomous Vehicle Systems	3
MECH 508	Hybrid and Electric Vehicles	3
MECH 520	Sensor Processing with Applications	3
MECH 521	HVAC Systems	3
MECH 527	Modern Control Systems	3
MECH 530	Advanced Kinematics and Mechanics	3
MECH 620	Advanced Vehicle Dynamics	3

Robotics and Autonomous Systems

ELEC 505	Advanced Mechatronics	3
MECH 503	Introduction to Autonomous Vehicle Systems	3
MECH 513	Perception Methods for Autonomous Systems	3
MECH 520	Sensor Processing with Applications	3
MECH 527	Modern Control Systems	3
MECH 530	Advanced Kinematics and Mechanics	3
MECH 532	Field Robotics	3
MECH 615	Pattern Recognition and Machine Learning	3
MECH 622	Path Planning and Navigation	3

Thermal-Fluid Sciences

MECH 500	Clean Energy Systems	3
MECH 511	Computational Heat Transfer	3
MECH 520	Sensor Processing with Applications	3
MECH 521	HVAC Systems	3
MECH 542	Computational Biofluid Mechanics	3
MECH 543	Kinetic Modeling of Thermo-Fluids Transport	3
MECH 601	Advanced Modeling Methods in Mechanical Engineering	3
MECH 614	Multidisciplinary Design Optimization	3
MECH 631	Conduction and Radiation Heat Transfer	3
MECH 632	Convection Heat Transfer	3
AERO 508	Intermediate Heat Transfer	3
AERO 515	Introduction to the Finite Element Method	3
AERO 521	Viscous Flow	3
AERO 610	Advanced Computational Fluid Dynamics	3
AERO 652	Turbulent Flows	3

General Mechanical Engineering

AERO 515	Introduction to the Finite Element Method	3
AERO 525	Structural Design Optimization	3
MECH 500	Clean Energy Systems	3
MECH 503	Introduction to Autonomous Vehicle Systems	3
MECH 506	Design for Manufacturing and Assembly	3
MECH 508	Hybrid and Electric Vehicles	3
MECH 511	Computational Heat Transfer	3
MECH 513	Perception Methods for Autonomous Systems	3
MECH 520	Sensor Processing with Applications	3

MECH 521	HVAC Systems	3
MECH 522	Mechanical System Design	3
MECH 523	Linear Systems	3
MECH 527	Modern Control Systems	3
MECH 530	Advanced Kinematics and Mechanics	3
MECH 532	Field Robotics	3
MECH 542	Computational Biofluid Mechanics	3
MECH 543	Kinetic Modeling of Thermo-Fluids Transport	3
MECH 544	Computational Biomechanics	3
MECH 548	Introduction to Continuum Mechanics	3
MECH 550	Modeling Complex Systems	3
MECH 560	Tissue Biomechanics	3
MECH 592	Mechanical Engineering Practicum	3
MECH 599	Special Topics in Mechanical Engineering	3
MECH 601	Advanced Modeling Methods in Mechanical Engineering	3
MECH 610	Automation and Additive Manufacturing	3
MECH 612	Computer Integrated Manufacturing	3
MECH 613	Advanced Model-Based Control Design	3
MECH 614	Multidisciplinary Design Optimization	3
MECH 615	Pattern Recognition and Machine Learning	3
MECH 616	Design and Manufacturing of Biomedical Devices	3
MECH 620	Advanced Vehicle Dynamics	3
MECH 622	Path Planning and Navigation	3
MECH 631	Conduction and Radiation Heat Transfer	3
MECH 632	Convection Heat Transfer	3
MECH 699	Special Topics in Mechanical Engineering	3

General Electives

Choose from the following General Electives:		
All MECH AOC Courses		
All 500-600 Level MECH courses		
Most 500 & 600 Level AERO/ELEC/CIVE/SFTW/CESC/CPSC courses with prior approval by MSME program coordinator		
DSCI 540	Data Mining	3
DSCI 544	Data Visualization	3
DSCI 615	Data Modeling	3
ENGP 501	Numerical Methods for Engineers and Scientists	3
ENGP 505	Spacecraft Dynamics and Control	3
ENGP 605	Spacecraft Power and Thermal Design	3

Suggested Plans of Study

Non-Thesis Option

Year One

Requirements	Credits
MECH 501 - Modeling Methods in Mechanical Engineering	3
Area of Concentration	3
Area of Concentration	3
Semester Hours	9
Requirements	Credits
ENGR 600 - Research Methods for Engineers	3
General Elective	3
Area of Concentration	3
Semester Hours	9

Total Credits

Total Hours for All Requirements: 18

Year Two

Requirements	Credits
General Elective	3
Area of Concentration	3
Semester Hours	6

Requirements	Credits
MECH 592 - Mechanical Engineering Practicum	3
Area of Concentration	3
Semester Hours	6

Total Credits

Total Hours for All Requirements: 12

Thesis Option

Year One

Requirements	Credits
MECH 501 - Modeling Methods in Mechanical Engineering	3
Area of Concentration	3
Area of Concentration	3
Semester Hours	9

Requirements	Credits
ENGR 600 - Research Methods for Engineers or MECH 700 - Graduate Thesis	3
General Elective	3
Area of Concentration	3
Semester Hours	9

Total Credits

Total Hours for All Requirements: 18

Year Two

Requirements	Credits
General Elective	3
MECH 700 - Graduate Thesis	3
Semester Hours	6

Requirements	Credits
Area of Concentration	3
MECH 700 - Graduate Thesis	3
Semester Hours	6

Total Credits

Total Hours for All Requirements: 12

Graduate Research Project Option

Year One

Requirements	Credits
MECH 501 - Modeling Methods in Mechanical Engineering	3
Area of Concentration	3
Area of Concentration	3
Semester Hours	9

Requirements	Credits
ENGR 600 - Research Methods for Engineers or MECH 700 - Graduate Thesis	3
General Elective	3
Area of Concentration	3
Semester Hours	9

Total Credits

Total Hours for All Requirements: 18

Year Two

Requirements	Credits
General Elective	3
MECH 690 - Graduate Research Project I	3
Semester Hours	6

Requirements	Credits
Area of Concentration	3
MECH 691 - Graduate Research Project II	3
Semester Hours	6

Total Credits

Total Hours for All Requirements: 12