M.S. in Aerospace Engineering

Degree Requirements

Non-Thesis Option

AE Core courses	6
Graduate Mathematics course [1]	3
Graduate Electives (at most six hours of non-AE courses in EP, other Engineering, Math, or BA 511, with Program Coordinator approval)	21
Total Credits	**30**

Thesis Option

AE Core courses	6
Graduate Mathematics course [1]	3
Graduate Electives (at most six hours of non-AE courses in EP, other Engineering, Math, or BA 511, with Advisor and Program Coordinator approval)	12
Thesis (AE 700) [2]	9
To remain on track for Thesis work: upon completion of the first 3 credit hours of Thesis, the student is required to submit a Topic Statement. Upon completion of the second 3 credit hours of Thesis, the student is required to conduct a pre-defense. Consult with the graduate program coordinator for additional information.	
Total Credits	**30**

[1] Recommended Graduate Mathematics Courses:
MA 502 or EP 501 for both the Aerodynamics and Propulsion and the Structures and Materials Concentrations, and MA 532, MA 502 or MA 510 for the Dynamics and Control Concentration. Students are encouraged to consult an advisor within their respective areas.

[2] Thesis Advisor must be AE Department faculty.

Areas of Concentration

Aerodynamics and Propulsion

This area includes Aerodynamics, Propulsion, Computational Aero and Fluid Dynamics, Transition and Turbulence, Aeroacoustics, Heat Transfer, and Combustion.

Core Courses for Aerodynamic and Propulsion Concentration [3]		
AE 504	Advanced Compressible Flow	3
AE 521	Viscous Flow	3
AE 528	Advanced Incompressible Aerodynamics	3
Electives for Aerodynamics and Propulsion Concentration [4]		
AE 507	Design, Build and Test	3
AE 508	Intermediate Heat Transfer	3
AE 512	Combustion I	3
AE 516	Computational Aeronautical Fluid Dynamics	3
AE 524	Rocket Engine Propulsion Systems	3
AE 536	Rotorcraft Aerodynamics	3
AE 550	Thermodynamics: Classic and Modern Perspectives	3
AE 554	Applied Engineering Analysis	3
AE 596	Graduate Internship in Aerospace Engineering [5]	1-3
AE 610	Advanced Computational Fluid Dynamics	3
AE 625	Hypersonic Aerospace Propulsive Flows	3
AE 631	Aeroacoustics	3
AE 635	Flow Stability and Control	3
AE 640	Turbine Engine Propulsion Systems	3
AE 652	Turbulent Flows	3
AE 699	Special Topics in Aerospace Engineering [5]	1-3

Dynamics and Control

This area includes the six degrees of freedom rigid body dynamics of aerospace vehicles, linear and nonlinear modeling and simulation of the dynamics, state and parameter estimation and the control of aerospace vehicles.

Core Courses for Dynamics and Control Concentration [3]		
AE 523	Linear Systems	3
AE 527	Modern Control Systems	3
AE 544	Analytical Dynamics	3
Electives for Dynamics and Control [4]		
AE 505	Spacecraft Dynamics and Control	3
AE 506	Airplane Dynamic Stability	3
AE 526	Engineering Optimization	3
AE 531	Orbital Mechanics	3
AE 552	Unconventional Aircraft Design	3
AE 553	Hybrid and Urban Air Mobility	3
AE 554	Applied Engineering Analysis	3
AE 596	Graduate Internship in Aerospace Engineering [5]	1-3
AE 623	Navigation, Guidance and Control	3
AE 626	Advanced Topics in Discrete Control Theory	3
AE 627	Adaptive Control	3
AE 629	Robust Control Systems	3
AE 633	Optimal Control	3
AE 646	Nonlinear Systems	3
AE 654	Geometric Mechanics and Control of Rigid Body Motions	3
AE 678	Estimation of Dynamic Systems	3
AE 699	Special Topics in Aerospace Engineering [5]	1-3

Structures and Materials

This area includes Structural Analysis, Vibration, Nondestructive Testing, Composite Materials, Elasticity, and Design Optimization.

Core Courses for the MSAE Structures and Materials Concentration [3]		
AE 502	Strength and Fatigue of Materials	3
AE 510	Aircraft Structural Dynamics	3
AE 522	Analysis of Aircraft Composite Materials	3
Core Courses for the PhD Program in the Structures and Materials Concentration [4]		
AE 514	Introduction to the Finite Element Method	3
AE 522	Analysis of Aircraft Composite Materials	3
AE 548	Introduction to Continuum Mechanics	3
Electives for Structures Concentration [4]		
AE 511	Engineering Materials Selection	3
AE 514	Introduction to the Finite Element Method	3
AE 520	Perturbation Methods in Engineering	3
AE 525	Structural Design Optimization	3
AE 532	Failure Analysis of Materials	3
AE 534	Smart Materials in Engineering	3
AE 538	Theory of Elasticity	3
AE 540	Structural Health Monitoring	3

AE 542	Mechanics of Structures: Variational and Computational Methods	3
AE 554	Applied Engineering Analysis	3
AE 596	Graduate Internship in Aerospace Engineering [5]	1-3
AE 606	Finite Element Aerospace Applications	3
AE 612	Analysis of Aircraft Plate and Shell Structures	3
AE 616	Advanced Aircraft Structural Dynamics	3
AE 618	Aeroelasticity	3
AE 648	Thermal Stresses in Aerospace Engineering	3
AE 699	Special Topics in Aerospace Engineering [5]	1-3

[3] Please note, the third core course may also be taken as an Elective.

[4] Courses from the other AOCs may also be counted as elective courses.

[5] A maximum of 3 hours of AE 596, Graduate Internship in Aerospace Engineering, may be counted toward Graduate Electives degree requirement for the non-thesis option only. A maximum of 3 hours of AE 699, Special Topics in Aerospace Engineering, may be counted toward Graduate Electives degree requirement for the non-thesis option only. AE 699 advisors must be AE Department faculty.