

MSME in Mechanical Systems and Control

Mechanical systems provides the engineering and scientific foundation for the design, control and optimization of machines defined as systems of interconnected elements that produce and control motions, forces, and material flows. It includes modeling (physical, mathematical and simulative), instrumentation and actuation, control and optimization methodologies (especially in real time), and methodologies for synthesis in the presence of multiple conflicting objectives.

MS Track for Systems and Control

The MSME degree program for dynamic systems and control is based on fundamental course work offered jointly through the Department of Mechanical Engineering (ME) and the Department of Electrical and Computer Engineering (ECE). This sequence of courses includes

ECE/ME 851	Linear Systems and Control (formerly ME852, ECE826)	Fall (every year)
ECE/ME 853	Optimal Control (formerly ECE829)	Spring (odd years)
ECE/ME 854	Robust Control (New Course)	Spring (even years)
ECE/ME 856	Adaptive Control (formerly ECE860A)	Fall (even years)
ECE/ME 859	Nonlinear Systems and Control (formerly ECE827)	Spring (every year)

Students should augment these courses with courses in the areas of Dynamics and Vibration, Solids and Structures and Data Acquisition as well as full filling breadth requirements in Fluid Mechanics or Thermal Engineering.

Graduate Course and Research Topics

Dynamic Systems:

Modeling and design of mechanical and mixed energy dynamic systems. State Space and Bond Graph methods. Simulation software design. Linear and non-linear transient simulation. Intelligent simulation methods for automated analysis of complex engineering systems.

Active Controls:

Mathematical modeling of engineering systems for feedback control. Feedback and feedforward controller design synthesis. Time domain and frequency domain robustness and stability analysis. Applications to rotorcraft, vehicle acoustics, distributed structures, mechanical servos and thermal systems

Typical M.S. Thesis Program
in
Mechanical System and Control

Fall Semester: 9 cr

ME 860	Theory of Vibrations	3 cr
ME/ECE851	Linear Systems and Control	3 cr
ME 456	Mechatronics Systems Design	3 cr

Spring Semester: 9cr

ME/ECE 859	Nonlinear Control	3 cr
ME 8xx	Breadth Course (see list below)	3 cr
(1) course from the list of courses below		3 cr
ME457	Mechatronics	
ME861	Advanced Dynamics	
ME/ECE 854	Robust Control (even Years, 3 cr)	
ME 855	Digital Data Acquisition and Control (odd years, 3 cr)	
ME 863	Nonlinear Vibrations (even years, 3 cr)	
ME 875	Optimal Design of Mechanical Systems (even years, 3 cr)	
	or other 400, 800 or 900 level courses inside or outside Mechanical Engineering	

Summer: 6 cr

ME 899	Master's Thesis Research	6 cr
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Fall Semester: 6 cr

ME8xx	Breadth Course (see list below)	3 cr
and one course from the list of courses below		3 cr
ME/ECE 856	Adaptive Control (Even Years, 3 cr)	
ME 872	Finite Element Method (3 cr)	
	or other 400, 800 or 900 level courses inside or outside Mechanical Engineering	

TOTAL**30 credits****Breadth Course Requirement:**

In addition to ECE/ME 851: Linear Systems and Control, each student must take course from at least two (2) of the three (3) areas below.

Solid and Structural Mechanics:	ME 820, ME 828
Fluid Mechanics:	ME 830
Thermal Sciences:	ME 802, ME 812, ME 814