

Guidelines for Course Selection

MS Degree Students

For an MS degree in the Mechanical and Industrial Engineering Department (MIE) a minimum of 30 credits are required. For an MS Thesis student, up to 9 credits of thesis can be taken and counted towards the 30 credits needed for graduation. For an MS Course Work Only student, up to 6 credits of independent studies can be taken. A complete description of the degree requirements are presented in the graduate handbook. This document is aimed at aiding students with course selection.

All M.S. students in the **Mechanical Engineering** program are required to take a minimum of four MIE courses from the list of eight courses shown below:

MIE 601	Advanced Thermodynamics	<i>or</i>	ChE 621 Thermodynamics
MIE 603	Numerical Methods		
MIE 605	Introduction to Finite Element Modeling, Analysis, and Applications		
MIE 607	Advanced Fluid Dynamics I		
MIE 609	Mechanical Property of Materials 4		
MIE 616	Design Optimization		
MIE 643	Mechatronics	<i>or</i>	MIE 641 Vibrations
MIE 644	Applied Data Analysis		

All M.S. students in the **Industrial Engineering and Operations Research** Program are required to take the following five courses:

MIE 620	Linear Programming
MIE 651	Production Planning I or MIE 697Q Logistics
MIE 657	Human Factors Design Engineering
MIE 684	Stochastic Processes in Industrial Engineering
MIE 754	Economic Decision Making for Engineers II

All M.S. students in the **Engineering Management** Program are required to take the following five courses:

MIE 657	Human Factors Engineering
MIE 697SEI	Introduction to Systems Engineering
MIE 686	Multiple Criteria Decision Making & Decision Analysis
MIE 754	Economic Decision Making
MIE 532	Network Optimization

In addition to the required courses listed above, there are a number of courses available to complete the required 30 credits. A number of possible elective courses are listed along with the approximate frequency with which they are offered. These courses are often offered in MIE, but can be found in a number of departments/colleges across campus.

Topic Area: Fluid Dynamics and Wind Energy

Fall (Approximate Frequency)

MIE 551 – Thermal Environmental Engineering (Once every two year)
MIE 573 – Engineering Windpower Systems (Every Year)
MIE 601 – Advanced Thermodynamics (Every year)
MIE 603 – Advanced Numerical Analysis (Every year)
MIE 607 – Advanced Fluid Mechanics (Every year)
MIE 697FS – Fluid Structure Interactions (Once every two years)
ChE 633 – Transport Process
CEE 670 – Transport Processes in Environmental and Water Resources
Physics 850 – Soft Condensed Matter Physics

Spring (Approximate Frequency)

MIE 570 – Solar and Direct Energy Conversion (Every year)
MIE 604 – Computational Fluid Dynamics (Once every two years)
MIE 605 – Finite Element Analysis (Every year)
MIE 673 – Wind Turbine Design (Once every two years)
MIE 674 – Offshore Wind Energy Systems (Once every two years)
MIE 701 – Advanced Thermodynamics (Once every two years)
MIE 707 – Viscous Fluids (Once every two years)
MIE 821 – Turbulence (Once every two years)
CEE 662 – Water Resource Systems Analysis
CEE 561 - Open Channel Flow
PHYS 553 - Optics-With Lab

Topic Area: Design and Bioengineering

Fall (Approximate Frequency)

MIE 603	Advanced Numerical Methods (Every year)
MIE 609	Mechanical Properties of Materials (Every year)
MIE 616	Engineering Design Optimization (Once every two years)
MIE 630	Advanced Solid Mechanics (Every year)
MIE 657	Human Factors Engineering (Every year)
MIE 697R	Biorobotics (Once every two years)
KIN 530	Mechanical Analysis of Human Movement (Every year)
KIN 797U	Computer Simulation of Human Movement (Every year)

Spring (Approximate Frequency)

STAT 506	Design of Experiments (Every year)
MIE 573	Engineering Windpower Systems (Every year)
MIE 597G	Mechatronics (Once every two years)
MIE 597W	Adaptive and Nonlinear Control (Once every two years)
MIE 597SM	Skeletal & Tissue Biomechanics (Once every two years)
MIE 605	Finite Element Analysis (Every year)
MIE 655	Quality Control and Reliability (Every year)
MIE 673	Wind Turbine Design (Once every two years)
MIE 686	Multiple Criteria Decision Making & Decision Analysis (Every year)
KIN 535	Muscle Mechanics (Every year)
CMPSCI 603	Robotics (Every year)

Topic Area: Dynamics and Controls

Fall (Approximate Frequency)

MIE 697FS	Fluid Structure Interactions (Once every two years)
MIE 697R	Biorobotics (Once every two years)
CEE 615	Probabilistic Methods in Structural Mechanics
MATH 532H	Nonlinear Dynamics and Chaos with Applications
ECE 580	Feedback Control Systems
PHYSICS 860C	Monte Carlo Techniques

Spring (Approximate Frequency)

MIE 605	Introduction to Finite Element Modeling, Analysis, and Applications (Yearly)
MIE 641	Vibrations (Once every two years)
MIE 644	Applied Data Analysis (Once every two years)
MIE 597G	Mechatronics (Once every two years)
MIE 597W	Adaptive and Nonlinear Control (Once every two years)
CMPSCI 603	Robotics (Every year)
CEE 541	Structural Dynamics

Topic Area: Materials Engineering

Fall (Approximate Frequency)

ChE 621 – Thermodynamics I (Every year)

MIE 603 – Advanced Numerical Analysis (Every year)

MIE 609 – Mechanical Properties of Materials (Every year)

MIE 630 – Advanced Solid Mechanics (Every year)

MIE 697MM – Metamaterials (Every two years)

POLYMER 797EM – Electron Microscopy (Every year)

POLYMER 897F – Surface & Interfacial Mechanics (Every year)

PHY 850 – Soft Condensed Matter Physics

Spring (Approximate Frequency)

MIE 571 – Physical and Chemical Processing of Materials (Every year)

MIE 579 – Advanced Materials Engineering (freq. TBD)

MIE 597E – Computational Materials Science (freq. TBD)

MIE 597MC – Advanced Materials Characterization

ChE 597D – Nanostructured Biomaterials

ChE 622 – Thermodynamics II (Every year)

MIE 605 – Finite Element Analysis (Every year)

PHY 558 – Solid State Physics (Every year)

POLYMER 501 – Introduction to Polymer Science & Eng (Every year; has prereqs.)

Topic Area: Industrial Engineering and Operations Research

Fall (Approximate Frequency)

MIE 620	Linear Programming (every year)
MIE 657	Human Factors Engineering (every year)
MIE 697SEI	Introduction to Systems Engineering (every year)
MIE 686	Multiple Criteria Decision Making & Decision Analysis (every year)
MIE 754	Economic Decision Making (every year)
MIE 532	Network OptimizationSCH-MGMT 752x: Deterministic Models (every year)
SCH-MGMT 758:	Supply Chain Management (every other year)
SCH-MGMT 797SS:	Quantitative Analysis in Supply Chain Ops. (frequency unknown)
SCH-MGMT 670:	Operations Management (every year)

Spring (Approximate Frequency)

MIE 651	Production Planning I (every year)
MIE 697Q	Logistics (every year)
MIE 684	Stochastic Processes in Industrial Engineering (every year)
MIE 754	Economic Decision Making for Engineers II (every year)
STAT 506	Design of Experiments (Every year)
MIE 597 C	Operations Research in Healthcare (every other year)
SCH-MGMT 597LG	Humanitarian Logistics and Healthcare (every other year)
SCH-MGMT 825x	Integer Programming (every other year)
SCH-MGMT 797AE	Stochastic Models (every year)