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 or 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 or 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)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>MIE 620</td>
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<td>Economic Decision Making</td>
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<td>MIE 532</td>
<td>Network Optimization</td>
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<tr>
<td>SCH-MGMT 758:</td>
<td>Supply Chain Management</td>
<td>(every other year)</td>
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<tr>
<td>SCH-MGMT 797SS:</td>
<td>Quantitative Analysis in Supply Chain Ops.</td>
<td>(frequency unknown)</td>
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<tr>
<td>SCH-MGMT 670:</td>
<td>Operations Management</td>
<td>(every year)</td>
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<td>MIE 697Q</td>
<td>Logistics</td>
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<td>MIE 684</td>
<td>Stochastic Processes in Industrial Engineering</td>
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<td>STAT 506</td>
<td>Design of Experiments</td>
<td>(Every year)</td>
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<td>MIE 597 C</td>
<td>Operations Research in Healthcare</td>
<td>(every other year)</td>
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<tr>
<td>SCH-MGMT 597LG</td>
<td>Humanitarian Logistics and Healthcare</td>
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<td>SCH-MGMT 825x</td>
<td>Integer Programming</td>
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<tr>
<td>SCH-MGMT 797AE</td>
<td>Stochastic Models</td>
<td>(every year)</td>
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