The MS in MSE requires a total of 30 credit hours. These courses are to be Engineering courses at 500-level or above, or Chemistry, Earth and Planetary Science, or Physics courses at 400-level or above. At least 15 units must be MEMS courses. For students pursuing the Thesis Option, at least 6 units must be Masters Research (MEMS 599), and at least 24 units must be coursework. All MS students must also complete 3 units (1 course) of mathematics at the graduate level selected from the list at the end of this document.

For students pursuing the **Course Option**, coursework must include at least 18 units (6 courses) from the following list of Materials Science and Engineering electives. For students pursuing the **Thesis Option**, coursework must include at least 12 units (4 courses) from this list. It is recommended that the student take at least one course from each from the following areas:

(A) **Structure**  
(B) **Characterization**  
(C) **Properties**  
(D) **Synthesis and Processing**

**MATERIALS SCIENCE AND ENGINEERING ELECTIVES**

**Structure**  
MEMS 5602 Non-Metallics  
MEMS 5608 Introduction to Polymer Science & Engineering  
MEMS 5612 Atomistic Modeling of Materials  
MEMS 5615 Metallurgy and Design of Alloys  
MEMS 5616 Defects in Materials  
EECE 502 Advanced Thermodynamics in EECE  
BME 523 Biomaterials Science  
BME 532 Physics of Biopolymers  
CHEM 465 Solid State & Materials Chemistry  
PHYS 472 Solid State Physics  
PHYS 537 Kinetics of Materials  
PHYS 539 Structure and Diffraction in Materials  
PHYS 549 Solid State Physics I  
PHYS 550 Solid State Physics II

**Characterization**  
MEMS 5506 Experimental Methods in Solid Mechanics  
MEMS 5603 Materials Characterization Techniques I  
MEMS 5604 Materials Characterization Techniques II

**Properties**  
MEMS 5102 Materials Selection in Design  
MEMS 5504 Fracture Mechanics  
MEMS 5507 Fatigue and Fracture Analysis  
MEMS 5560 Interfaces and Attachments in Natural and Engineered Structures  
MEMS 5601 Mechanical Behavior of Materials  
MEMS 5605 Mechanical Behavior of Composites  
MEMS 5610 Quantitative Materials Science & Engineering  
CHEM 543 Physical Properties of Quantum Nanostructures

**Synthesis & Processing**
MEMS 5607 Introduction to Polymer Blends & Composites  
MEMS 5609 Electronic Materials Processing  
MEMS 5611 Principles and Methods in Micro and Nanofabrication  
MEMS 5613 Biomaterials Processing  
MEMS 5614 Polymeric Materials Synthesis and Modification  
MEMS 5801 Micro-Electro-Mechanical Systems I  
EECE 505 Aquatic Chemistry  
CHEM 426 Inorganic Electrochemistry and Photochemistry  
CHEM 452 Synthetic Polymer Chemistry  

**Special Topics**  
MEMS 5606 Soft Nanomaterials  
ESE 531 Nano & Micro Photonics  
ESE 532 Introduction to Nano-Photonic Devices  
ESE 536 Introduction to Quantum Optics  
EECE 504 Aerosol Science & Technology  
EECE 574 Electrochemical Engineering  
EECE 571 Industrial and Environmental Catalysis  
CHEM 542 Special Topics in Inorganic Chemistry: The Chemistry of Energy Storage  
EPS 567 Planetary Materials  

**MATHEMATICS REQUIREMENT**  
The following courses may be used to fulfill the graduate-level math requirement:  

Any course taught by the Math department at the 400 level or higher.  
EECE 503 Mathematical Methods in EECE  
ESE 405 Reliability and Quality Control  
ESE 415 Optimization  
ESE 501-502 Mathematics of Modern Engineering I, II  
ESE 517 Partial Differential Equations  
ESE 520 Probability and Stochastic Processes  
MEMS 5001 Optimization Methods in Engineering  
MEMS 5301 Nonlinear Vibrations  
MEMS 5403 Conduction and Convection Heat Transfer  
MEMS 5501 Mechanics of Continua  
MEMS 5610 Quantitative Materials Science and Engineering  
Physics 501-502 Theoretical Physics (must know quantum mechanics)  
Physics 503-504 Advanced Math Methods for Physicists and Engineers