M.S. in Materials Science and Engineering

Degree Requirements

Students who lack appropriate undergraduate preparation for the program may be admitted and required to make up deficiencies by taking a program of bridge courses which is designed in consultation with the graduate advisor. These courses are taken in addition to the degree requirements and may include undergraduate courses.

Candidates must complete a minimum of 30 credits, including 18 credits of required materials science courses and 12 credits in an area of specialization, which are selected in consultation with the program director or graduate advisor.

Seminar

In addition to the minimum 30 degree credits required, all students who receive program or research-based awards must enroll each semester in MTSE 791 Graduate Seminar.

M.S. in Materials Science and Engineering (courses only)

Required Courses		
MTSE 601	Fundamentals of Engineering Materials	3
MTSE 602	Thermodynamics of Materials	3
MTSE 719	Physical Principles of Characterization of Solids	3
Select three of the following:		9
MTSE 610	Mechanical Properties of Materials	
MTSE 655	Diffusion and Solid State Kinetics	
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
BME 672	Biomaterials	
CHE 681	Polymerization-Principles and Practice	
CHE 682	Polymer Structures and Properties	
CHE 602	Selected Topics in Chemical Engineering I	
ECE 657	Semiconductor Devices	
PHYS 682	Introduction To Mems	
PHYS 687	Physics of Materials	
Area of Specialization [1]		
Select four courses from one of the following areas:		12
Electronic and Photonic Materials		
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 687	Glass Science and Engineering	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 719	Physical Principles of Characterization of Solids	
MTSE 722	Science and Technology of Thin Films	
MTSE 723	Defects in Solids	
MTSE 724	Transport of Electrons and Phonons in Solids	
MTSE 725	Crystallography and Diffraction	
PHYS 661	Solid-State Physics	
PHYS 682	Introduction To Mems	
PHYS 687	Physics of Materials	
PHYS 789	Physics of Advanced Semiconductor Device Processing	
CHE 702	Selected Topics in Chemical Engineering II (Selected Topics in Chemical Engineering II)	
ECE 623	Fourier Optics	
ECE 625	Fiber and Integrated Optics	
ECE 626	Optoelectronics	

ECE 657	Semiconductor Devices
ECE 658	VLSI Design I
ECE 659	Fabrication Principles of Electronic and Optoelectronic Devices
ECE 739	Laser Systems
ECE 760	Solid-State Image Sensors
Polymer and Biomaterials [2]	
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
MTSE 722	Science and Technology of Thin Films
MTSE 655	Diffusion and Solid State Kinetics
BME 669	Engineering Physiology
BME 672	Biomaterials
BME 667	Bio-Control Systems
BME 698	Selected Topics
CHE 681	Polymerization-Principles and Practice
CHE 682	Polymer Structures and Properties
CHE 627	Introduction to Biomedical Engineering
CHE 702	Selected Topics in Chemical Engineering II
CHEM 661	Instrumental Analysis Laboratory
CHEM 673	Biochemistry
MATH 661	Applied Statistics
ME 670	Introduction to Biomechanical Engineering
ME 671	Biomechanics of Human Structure and Motion
ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
Particulate and Nano Materials	
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
MTSE 722	Science and Technology of Thin Films
MTSE 655	Diffusion and Solid State Kinetics
BME 669	Engineering Physiology
BME 672	Biomaterials
CHE 681	Polymerization-Principles and Practice
CHE 682	Polymer Structures and Properties
CHE 627	Introduction to Biomedical Engineering
PHYS 661	Solid-State Physics
PHYS 682	Introduction To Mems
PHYS 687	Physics of Materials
ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
Other Fields of Materials Science and Engineering	
MTSE 655	Diffusion and Solid State Kinetics

MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
MTSE 722	Science and Technology of Thin Films
MTSE 723	Defects in Solids
MTSE 724	Transport of Electrons and Phonons in Solids
MTSE 725	Crystallography and Diffraction
PHYS 661	Solid-State Physics
CHE 681	Polymerization-Principles and Practice
CHE 682	Polymer Structures and Properties
BME 672	Biomaterials
BME 667	Bio-Control Systems
BME 698	Selected Topics
CHE 627	Introduction to Biomedical Engineering
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CHEM 673	Biochemistry
MATH 661	Applied Statistics
ME 670	Introduction to Biomechanical Engineering
ME 671	Biomechanics of Human Structure and Motion
ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
PHYS 682	Introduction To Mems
PHYS 687	Physics of Materials
Total Credits	**30**

[1] The range of possible specialization is broad. Students should consult the graduate advisor in designing the area of specialization and related degree requirements. Three areas and suggested courses are listed.

[2] Courses in metallic biomaterials and polymeric biomaterials offered at the University of Medicine and Dentistry of New Jersey may be taken as electives. See the program director/graduate advisor for information on how to register for them.

M.S. in Materials Science and Engineering (Master's project)

Required Courses		
MTSE 601	Fundamentals of Engineering Materials	3
MTSE 602	Thermodynamics of Materials	3
MTSE 719	Physical Principles of Characterization of Solids	3
Select three of the following:		9
MTSE 610	Mechanical Properties of Materials	
MTSE 655	Diffusion and Solid State Kinetics	
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
BME 672	Biomaterials	
CHE 681	Polymerization-Principles and Practice	
CHE 682	Polymer Structures and Properties	
CHE 602	Selected Topics in Chemical Engineering I	
ECE 657	Semiconductor Devices	
PHYS 682	Introduction To Mems	

PHYS 687	Physics of Materials	
Project		
MTSE 700	Master'S Project	3
Area of Specialization [1]		
Select four courses from one of the following areas:		12
Electronic and Photonic Materials		
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 687	Glass Science and Engineering	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 719	Physical Principles of Characterization of Solids	
MTSE 722	Science and Technology of Thin Films	
MTSE 723	Defects in Solids	
MTSE 724	Transport of Electrons and Phonons in Solids	
MTSE 725	Crystallography and Diffraction	
PHYS 661	Solid-State Physics	
PHYS 682	Introduction To Mems	
PHYS 687	Physics of Materials	
PHYS 789	Physics of Advanced Semiconductor Device Processing	
CHE 702	Selected Topics in Chemical Engineering II (Selected Topics in Chemical Engineering II)	
ECE 623	Fourier Optics	
ECE 625	Fiber and Integrated Optics	
ECE 626	Optoelectronics	
ECE 657	Semiconductor Devices	
ECE 658	VLSI Design I	
ECE 659	Fabrication Principles of Electronic and Optoelectronic Devices	
ECE 739	Laser Systems	
ECE 760	Solid-State Image Sensors	
Polymer and Biomaterials [2]		
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 687	Glass Science and Engineering	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 719	Physical Principles of Characterization of Solids	
MTSE 722	Science and Technology of Thin Films	
MTSE 655	Diffusion and Solid State Kinetics	
BME 669	Engineering Physiology	
BME 672	Biomaterials	
BME 667	Bio-Control Systems	
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CHE 681	Polymerization-Principles and Practice	
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CHE 627	Introduction to Biomedical Engineering	
CHE 702	Selected Topics in Chemical Engineering II	
CHEM 661	Instrumental Analysis Laboratory	
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MATH 661	Applied Statistics	
ME 670	Introduction to Biomechanical Engineering	
ME 671	Biomechanics of Human Structure and Motion	
ME 675	Mechanics of Fiber Composites	
ME 676	Applied Plasticity	
ME 678	Engineering Design of Plastic Products	

ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
Particulate and Nano Materials	
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
MTSE 722	Science and Technology of Thin Films
MTSE 655	Diffusion and Solid State Kinetics
BME 669	Engineering Physiology
BME 672	Biomaterials
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CHE 682	Polymer Structures and Properties
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PHYS 661	Solid-State Physics
PHYS 682	Introduction To Mems
PHYS 687	Physics of Materials
ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
Other Fields of Materials Science and Engineering	
MTSE 655	Diffusion and Solid State Kinetics
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
MTSE 722	Science and Technology of Thin Films
MTSE 723	Defects in Solids
MTSE 724	Transport of Electrons and Phonons in Solids
MTSE 725	Crystallography and Diffraction
PHYS 661	Solid-State Physics
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ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
PHYS 682	Introduction To Mems

PHYS 687	Physics of Materials	
Total Credits		**33**

1 The range of possible specialization is broad. Students should consult the graduate advisor in designing the area of specialization and related degree requirements. Three areas and suggested courses are listed.

2 Courses in metallic biomaterials and polymeric biomaterials offered at the University of Medicine and Dentistry of New Jersey may be taken as electives. See the program director/graduate advisor for information on how to register for them.

M.S. in Materials Science and Engineering (Master's thesis)

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MTSE 682	Introduction to Ceramics	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
BME 672	Biomaterials	
CHE 681	Polymerization-Principles and Practice	
CHE 682	Polymer Structures and Properties	
CHE 602	Selected Topics in Chemical Engineering I	
ECE 657	Semiconductor Devices	
PHYS 682	Introduction To Mems	
PHYS 687	Physics of Materials	
Thesis		
MTSE 701	Master'S Thesis	6
Area of Specialization [1]		
Select four courses from one of the following areas:		12
Electronic and Photonic Materials		
MTSE 681	Composite Materials	
MTSE 682	Introduction to Ceramics	
MTSE 687	Glass Science and Engineering	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 719	Physical Principles of Characterization of Solids	
MTSE 722	Science and Technology of Thin Films	
MTSE 723	Defects in Solids	
MTSE 724	Transport of Electrons and Phonons in Solids	
MTSE 725	Crystallography and Diffraction	
PHYS 661	Solid-State Physics	
PHYS 682	Introduction To Mems	
PHYS 687	Physics of Materials	
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ECE 623	Fourier Optics	
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ECE 658	VLSI Design I	
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Polymer and Biomaterials [2]	
MTSE 681	Composite Materials
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ME 678	Engineering Design of Plastic Products
ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
Particulate and Nano Materials	
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids
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Other Fields of Materials Science and Engineering	
MTSE 655	Diffusion and Solid State Kinetics
MTSE 681	Composite Materials
MTSE 682	Introduction to Ceramics
MTSE 687	Glass Science and Engineering
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 719	Physical Principles of Characterization of Solids

MTSE 722	Science and Technology of Thin Films
MTSE 723	Defects in Solids
MTSE 724	Transport of Electrons and Phonons in Solids
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ME 675	Mechanics of Fiber Composites
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products
ME 679	Polymer Processing Techniques
ME 680	Polymer Processing Equipment
PHYS 682	Introduction To Mems
PHYS 687	Physics of Materials
Total Credits	**36**

1 The range of possible specialization is broad. Students should consult the graduate advisor in designing the area of specialization and related degree requirements. Three areas and suggested courses are listed.

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