

M.S. in Materials Science and Engineering

The program is offered in two options, the **Materials Science option** and the **Materials Engineering option**. These options are administered by the CSLA (College of Science and Liberal Arts) and NCE (Newark College of Engineering) colleges, respectively. A joint committee involving CSLA and NCE faculty will be in charge of overseeing this program.

Students learn about the synthesis, properties, modeling, and applications of various materials in this program. There are two options in this program - Materials Science Option and Materials Engineering Option.

Materials Science Option

Administered by Department of Physics, CSLA

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 12 credits of required materials science courses and 18 credits in a track, which are selected in consultation with the program director or graduate advisor. The 30 credits could include 3 credits of MTSE 700 Master's Project or 6 credits of MTSE 701 Master's Thesis, but not both.

Seminar

All students must enroll each semester in MTSE 791 (Graduate Seminar, 0 credit), unless the requirement is waived by the Director for Materials Science Option of Materials Science and Engineering program.

Track

The range of possible tracks and courses is broad and is not limited to the tracks and courses listed here. Students should consult the graduate advisor in designing the track and the course requirements of the track.

Cross-listed courses

Any cross-listed courses will not be offered simultaneously, but only one of the two will be offered at a time.

M.S. in Materials Science and Engineering – Materials Science Option

Code	Title	Credits
Required Courses (2 common and 2 selective courses)		
MTSE 601 or MTEN 610	Fundamentals of Engineering Materials Found of Materials Sci & Engr	3
MTSE 602 or MTEN 612	Thermodynamics of Materials Thermodynamics of Materials	3
Select two of the following four courses:		6
MTSE 603	Intro to Phys Prin of Material	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 765	Science and Technology of Thin Films	
CHEM 748 or MTEN 712	Nanomaterials Nanomaterials	
Area of Specialization ¹		
Select six courses from one of the following areas:		18
Electronic and Photonic Materials		
MTSE 603	Intro to Phys Prin of Material	
MTSE 688	Mathematical and Statistical Methods in Materials Science	
MTSE 765	Science and Technology of Thin Films	
CHEM 748 or MTEN 712	Nanomaterials Nanomaterials	
MTSE 610	Mechanical Properties of Materials	

MTSE 655 or MTEN 611	Diffusion and Solid State Kinetics Diffusion & Solid State Kineti
MTSE 681	Composite Materials
MTSE 719	Physical Principles of Characterization of 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
PHYS 611	Adv Classical Mechanics
PHYS 621	Classical Electrodynamics
PHYS 641	Statistical Mechanics
R755 631	Quantum Mechanics
PHYS 731	Quantum Mechanics II
CHEM 610	Advanced Inorganic Chemistry
CHEM 658	Advanced Physical Chemistry
CHEM 737	Applications of Computational Chemistry and Molecular Modeling
CHEM 764	Advanced Analytical Chemistry
CHE 702	Selected Topics in Chemical Engineering II
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
Particulate and Nano Materials	
MTSE 603	Intro to Phys Prin of Material
MTSE 688	Mathematical and Statistical Methods in Materials Science
MTSE 765	Science and Technology of Thin Films
CHEM 748 or MTEN 712	Nanomaterials Nanomaterials
MTSE 610	Mechanical Properties of Materials
MTSE 655 or MTEN 611	Diffusion and Solid State Kinetics Diffusion & Solid State Kineti
MTSE 681	Composite Materials
MTSE 719	Physical Principles of Characterization of Solids
MTSE 655 or MTEN 611	Diffusion and Solid State Kinetics Diffusion & Solid State Kineti
MTSE 725	Crystallography and Diffraction
CHEM 605	Advanced Organic Chemistry I: Structure
CHEM 610	Advanced Inorganic Chemistry
CHEM 658	Advanced Physical Chemistry
CHEM 673	Biochemistry
CHEM 737	Applications of Computational Chemistry and Molecular Modeling
CHEM 764	Advanced Analytical Chemistry
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
PHYS 611	Adv Classical Mechanics
PHYS 621	Classical Electrodynamics
PHYS 641	Statistical Mechanics
R755 631	Quantum Mechanics
PHYS 731	Quantum Mechanics II
ME 676	Applied Plasticity
ME 678	Engineering Design of Plastic Products

Mathematical and Computational Materials Science Track

MTSE 603	Intro to Phys Prin of Material
MTSE 688	Mathematical and Statistical Methods in Materials Science
MATH 611	Numerical Methods for Computation
MATH 613	Advanced Applied Mathematics I: Modeling
MATH 666	Simulation for Finance
MATH 671	Asymptotic Methods I
MATH 675	Partial Differential Equations
MATH 677	Calculus of Variations
MATH 689	Advanced Applied Mathematics II: Ordinary Differential Equations
MATH 690	Advanced Applied Mathematics III: Partial Differential Equations
MATH 712	Numerical Methods II
MATH 713	Advanced Scientific Computing: Multi-Dimensional Finite-Difference Schemes and Spectral Methods
MATH 722	Wave Propagation
MATH 767	Fast Numerical Algorithms
MATH 661	Applied Statistics
PHYS 661	Solid-State Physics
PHYS 611	Adv Classical Mechanics
PHYS 621	Classical Electrodynamics
PHYS 641	Statistical Mechanics
R755 631	Quantum Mechanics
PHYS 731	Quantum Mechanics II
CHEM 737	Applications of Computational Chemistry and Molecular Modeling
MTSE 765	Science and Technology of Thin Films
CHEM 748 or MTEN 712	Nanomaterials Nanomaterials

Project

MTSE 700B	Master'S Project
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Thesis

MTSE 701B	Master's Thesis
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Total Credits

30