

College of Engineering Distance Education Graduate Degree Programs, Degree Requirements and Course Offerings

Master of Engineering

Program Requirements: The student must complete a total of 30 credit hours at the graduate level including the completion of three courses from a single engineering discipline or computer science. The completion of five courses in a designated concentration field will allow the student to have the concentration area listed on the student's NC State transcript. The remaining courses can be taken from any course offerings in the Engineering Online program.

Courses Available from Materials Science and Engineering for Area of Specialization

MSE 500 Modern Concepts in Materials Science
MSE 556 Composite Materials
MSE 702 Defects in Solids
MSE 705 Mechanical Behavior of Engineering Materials
MSE 706 Phase Transformation & Kinetics
MSE 708 Thermodynamics of Materials
MSE 712 Scanning Electron Microscopy
MSE 715 Fundamentals of Transmission Electron Microscopy
MSE 761 Polymer Blends and Alloys
MSE 791K Modeling from the Nanoscale to the Macroscale

Courses Available from Electrical and Computer Engineering for Area of Specialization

ECE 506 Architecture of Parallel Computers
ECE 511 Analog Electronics
ECE 515 Digital Communications
ECE 517 Object-Oriented Languages and Systems
ECE 520 Digital ASIC Design
ECE 521 Computer Design and Technology
ECE 525 Medical Instrumentation
ECE 535 Design of Electromechanical Systems
ECE 538 Integrated Circuit Technology Fabrication
ECE 544 Design of Electronic Packaging and Interconnects
ECE 549 RF Design for Wireless
ECE 556 Agent-based Mechatronics Systems
ECE 570 Computer Networks
ECE 573 Internet Protocols
ECE 576 Connection-Oriented Networks
ECE 579 Introduction to Computer Performance Modeling
ECE 582 Wireless Communication Systems
ECE 591Z Computational Intelligence: Neural, Fuzzy and Genetic Systems
ECE 716 System Control Engineering
ECE 718 Computer-Aided Circuit Analysis
ECE 723 Optical Properties of Semiconductors
ECE 733 Digital Electronics
ECE 752 Information Theory
ECE 775 Optical Networks
ECE 792X Integrated Circuit Design for Wireless Communications

Courses Available from Nuclear Engineering for Area of Specialization

NE 591U Radiation and Reactor Fundamentals

Courses Available from Computer Science for Area of Specialization

CSC 501 Operating Systems Principles
CSC 505 Design and Analysis of Algorithms
CSC 506 Architecture of Parallel Computers
CSC 510 Software Engineering
CSC 512 Compiler Construction
CSC 513 Electronic Commerce Technology
CSC 517 Object-Oriented Languages and Systems
CSC 520 Artificial Intelligence I
CSC 541 Advanced Data Structures
CSC 546 Management Decisions and Control Systems
CSC 557 Multimedia Computing & Networking
CSC 570 Computer Networks
CSC 573 Internet Protocols
CSC 576 Connection-Oriented Networks
CSC 579 Introduction to Computer Performance Modeling
CSC 582 Computer Models of Interactive Narrative
CSC 750 Service-Oriented Computing
CSC 775 Optical Networks
CSC 750 Web Services.

Courses Available from Mechanical and Aerospace Engineering for Area of Specialization

MAE 501 Advanced Engineering Thermodynamics
MAE 504 Fluid Dynamics of Combustion I
MAE 505 Heat Transfer Theory Applications
MAE 513 Principles of Structural Vibrations
MAE 518 Acoustic Radiation I
MAE 521 Linear Control and Design for Mimo Systems
MAE 524 Principles of Mechatronic Control
MAE 533 Finite Element Analysis
MAE 534 Mechantronics Design
MAE 537 Mechanics of Composite Structure
MAE 541 Advanced Machine Design
MAE 543 Fracture Mechanics
MAE 544 Real Time Robotics
MAE 545 Metrology for Precision Manufacturing
MAE 550 Foundations of Fluid Dynamics
MAE 560 Computational Fluid Mechanics and Heat Transfer
MAE 561 Wing Theory
MAE 575 Advanced Propulsion
MAE 589 Astrodynamics
MAE 589C Spacecraft Control
MAE 589D Spacecraft Attitude Dynamics
MAE 589G Space Flight Guidance and Navigation
MAE 589Q Design for Strength and Endurance
MAE 589R Advanced Propulsion

MAE 589W Smart Materials
MAE 589 U and Y – Special Engineering Topics I and II – GE students only
MAE 589Z Mechanical Design Engineering
MAE 704 Fluid Dynamics of Combustion II
MAE 742 Mechanical Design for Assembly

Courses Available from Industrial Engineering for Area of Specialization

IE 510 Applied Engineering Economy
IE 514 Manufacturing Product Engineering
IE 544 Occupational Biomechanics
IE 546 Management Decision and Controls Systems
IE 589M Lean Production Principles and Practices
IE 589V Engineering Product Management
IE 707 Real-Time Control of Automated Manufacturing
IE 712 Bayesian Decision Analysis for Engineers and Managers
IE 715 Manufacturing Process Engineering
IE 716 Automated Systems Engineering
IE 719 CIM System Design
IE 723 Product Planning, Scheduling & Inventory Control
IE 741 Occupational Safety Engineering
IE 748 Quality Engineering
IE 791B Rapid Prototyping

Courses Available from Chemical and Biomolecular Engineering for Area of Specialization

CHE 543 Polymer Science and Technology
CHE 551 Biochemical Engineering
CHE 575 Advances in Pollution Prevention: Environmental Management
CHE 596A Life Cycle Analysis
CHE 596I Colloid Science and Nanoscale Engineering
CHE 596U Fundamentals of Transport Phenomena
CHE 597C Molecular Cell Engineering
CHE 597J Polymers at Interfaces and in Confined Geometries
CHE 598K Polymer Rheology and Processing
CHE 711 Chemical Engineering Process Modeling
CHE 713 Thermodynamics I
CHE 717 Chemical Reaction Engineering
CHE 718 Advanced Chemical Reaction Engineering
CHE 761 Polymer Blends and Alloys

Courses Available from Civil, Construction and Environmental Engineering for Area of Specialization

CE 501 Transportation Systems Engineering
CE 502 Traffic Operations
CE 509 Highway Safety
CE 522 Theory and Design of Prestressed Concrete
CE 523 Theory and Behavior of Steel Structures
CE 524 Analysis and Design of Masonry Structures
CE 525 Structural Analysis II
CE 528 Structural Design in Wood

CE 561 Construction Project Management
CE 564 Legal Aspect of Contracting
CE 567 Risk and Financial Management in Construction
CE 571 Physical Principles of Environmental Engineering
CE 573 Biological Principles of Environmental Engineering
CE 574 Chemical Properties of Environmental Engineering
CE 576 Engineering Principles of Air Pollution Control
CE 579 Principles of Air Quality Engineering
CE 577 Engineering Principles of Solid Waste Management
CE 584 Hydraulics of Ground Water
CE 588 Water Resource Engineering
CE 596F Environmental Process Biotechnology for Engineers
CE 702 Traffic Flow Theory
CE 720 Matrix and Finite Element Structural Analysis I
CE 722 Structural Dynamics
CE 723 Advanced Structural Dynamics
CE 725 Earthquake Structural Engineering
CE 726 Advanced Theory of Concrete Structures
CE 741 Advanced Soil Mechanics I
CE 742 Advanced Soil Mechanics II
CE 744 Foundation Engineering
CE 746 Dynamics of Soils and Foundations
CE 747 Geosynthetics in Geotechnical Engineering
CE 751 Theory of Concrete Mixtures
CE 757 Pavement Management Systems
CE 761 Design of Temporary Structures in Construction
CE 766 Building Construction Systems
CE 771 Physical-Chemical Water Treatment Processes
CE 772 Environmental Exposure and Risk Analysis
CE 774 Environmental Bioprocess Technology

Additional Courses Available

MA 501 Adv. Mathematics for Engineers & Scientists I
MA 502 Adv. Mathematics for Engineers & Scientists II

Master of Civil Engineering

Program Requirements: The student must complete a total of 30 credit hours at the graduate level. Approximately two-thirds must be taken in civil engineering within an area of emphasis, and supporting courses should be from one or two other areas within civil engineering. The remaining one-third of the credits may consist of any graduate level civil engineering or related supporting courses from other departments.

Areas of Emphasis

Construction Engineering and Management

CE 561 Construction Project Management
CE 564 Legal Aspects of Contracting
CE 567 Risk and Financial Management in Construction
CE 751 Theory of Concrete Mixtures
CE 761 Design of Temporary Structures in Construction
CE 766 Building Construction Systems

Environmental Engineering

CE 571 Physical Principles in Environmental Engineering
CE 572 Design of Water and Wastewater Facilities
CE 573 Biological Principles of Environmental Engineering
CE 574 Chemical Principles of Environmental Engineering
CE 576 Engineering Principles of Air Pollution Control
CE 577 Engineering Principles of Solid Waste Management
CE 579 Principles of Air Quality Engineering
CE 771 Physical-Chemical Water Treatment Processes
CE 772 Environmental Exposure and Risk Analysis
CE 774 Environmental Bioprocess Technology

Geotechnical/Geoenvironmental Engineering

CE 584 Hydraulics of Ground Water
CE 593 Special Topics in Geotechnical Engineering
(GE 593B – Rock Mechanics)
CE 741 Advanced Soil Mechanics I
CE 742 Advanced Soil Mechanics II
CE 744 Foundation Engineering
CE 747 Geosynthetics in Geotechnical Engineering

Structures and Mechanics

CE 522 Theory and Design of Prestressed Concrete
CE 523 Theory and Behavior of Steel Structures
CE 524 Analysis and Design of Masonry Structures
CE 528 Structural Design in Wood
CE 594 Special Topics in Structural Mechanics
CE 715 Advanced Strength of Materials
CE 720 Matrix and Finite Element Structural Analysis I
CE 722 Structural Dynamics
CE 725 Earthquake Structural Engineering
CE 726 Advanced Theory & Concrete Structures

Transportation Systems and Materials

CE 501 Transportation Systems Engineering
CE 502 Traffic Operations
CE 509 Highway Safety
CE 702 Traffic Flow Theory
CE 755 Highway Pavement Design
CE 757 Pavement Management Systems

Water Resources and Coastal Engineering (courses are combined with environmental for area of emphasis)

CE 584 Hydraulics of Groundwater
CE 588 Water Resources Engineering

Other available courses of possible interest:

CE 759 Inelastic Behavior of Construction Materials
IE 510 Applied Engineering Economy
MA 501 Adv. Mathematics for Engineers & Scientists I
MA 502 Adv. Mathematics for Engineers & Scientists II
MAE 533 Finite Element Analysis
MSE 705 Mechanical Behavior of Engineering Materials

Master of Computer Science

Program Requirements: The student must complete a total of 31 credit hours at the graduate level including the completion of three core courses in Computer Science. At least twenty-one hours must be in courses bearing the CSC prefix and must include CSC 600. The remaining three courses may consist of any graduate level engineering (including computer science), mathematics or statistics courses offering through Engineering Online.

CSC Core Requirements

At least two courses must be taken from one of the following categories and one from the other category.

Category 1: Theory

CSC 505 Design and Analysis of Algorithms
CSC 512 Compiler Construction
CSC 565 Graph Theory
CSC 579 Performance Modeling
CSC 580 Numerical Analysis*
CSC 707 Theory of Computation

Category 2: Systems

CSC 501 Operating Systems
CSC 506 Architecture of Parallel Computers
CSC 510 Software Engineering
CSC 520 Artificial Intelligence
CSC 540 Database Systems
CSC 562 Graphics*
CSC 570 Networks

*not available online to date

Other Online CSC Courses:

CSC 505 Design and Analysis of Algorithms
CSC 513 Electronic Commerce Technology
CSC 517 Object-Oriented Languages and Systems
CSC 520 Artificial Intelligence I
CSC 541 Advanced Data Structures
CSC 546 Management Decision and Control Systems
CSC 557 Multimedia Computing and Networking
CSC 573 Internet Protocols
CSC 576 Connection-Oriented Networks
CSC 582 Computer Models of Interactive Narrative
CSC 750 Web Services

Other Online Courses :

MA 501 Advanced Mathematics for Engineers & Scientists I
MA 502 Advanced Mathematics for Engineers & Scientists II
ECE 520 Digital ASIC Design
ECE 521 Computer Design and Technology

Master of Science in Aerospace Engineering

Program Requirements: The student must complete a total of 30 credit hours at the graduate level. A minimum of four core Mechanical and Aerospace (MAE) courses must be taken from a concentration area and two additional MAE courses must be taken at the 500 or 700 level. In addition each student must complete three credits of MAE 586, Project Work in Aerospace Engineering. The remaining three courses may consist of any graduate level engineering, mathematics or statistics courses offered through Engineering Online.

MAE Core Requirements offered online a minimum of every two years. A concentration must be selected from one of the following areas of study.

Aerodynamics, Fluid Mechanics and Propulsion

MAE 504 Fluid Dynamics of Combustion I
MAE 550 Foundations of Fluid Dynamics
MAE 553 Compressible Fluid Flow
MAE 560 Computational Fluid Mech. & Heat Transfer
MAE 561 Wing Theory
MAE 575 Advanced Propulsion

Aerospace Structures, Materials and Control

MAE 513 Principles of Structural Vibration
MAE 518 Acoustic Radiation I
MAE 524 Principles of Mechatronic Control
MAE 533 Finite Element Analysis I
MAE 534 Mechatronics Design
MAE 535 Design of Electromechanical Systems

MAE 537 Mechanics of Composite Structures

Additional Online Courses Available:

MAE 501 Advanced Engineering Thermodynamics
MAE 505 Heat Transfer Theory and Applications
MAE 521 Linear Control & Design for MIMO
MAE 541 Advanced Machine Design I
MAE 544 Real Time Robotics
MAE 545 Metrology for Precision Manufacturing
MAE 543 Fracture Mechanics
MAE 589 Astrodynamics
MAE 589C Spacecraft Control
MAE 589D Spacecraft Attitude Dynamics
MAE 589G Space Flight Guidance and Navigation
MAE 589Q Design for Strength and Endurance
MAE 589W Smart Materials
MAE 589Z Mechanical Design Engineering
MAE 742 Mechanical Design for Automated Assembly
MA 501 Adv. Mathematics for Engineers & Scientists I
MA 502 Adv. Mathematics for Engineers & Scientists II

Master of Science in Mechanical Engineering

Program Requirements: The student must complete a total of 30 credit hours at the graduate level. A minimum of four core Mechanical and Aerospace (MAE) courses must be taken from a concentration area and two additional MAE courses must be taken at the 500 or 700 level. In addition each student must complete three credits of MAE 586, Project Work in Mechanical Engineering. The remaining three courses may consist of any graduate level engineering, mathematics or statistics courses offered through Engineering Online.

Thermal/Fluid Sciences

MAE 501 Advanced Engineering Thermodynamics
MAE 504 Fluid Dynamics of Combustion I
MAE 505 Heat Transfer Theory and Applications
MAE 550 Foundations of Fluid Dynamics
MAE 553 Compressible Fluid Flow
MAE 560 Computational Fluid Mechanics & Heat Transfer

Dynamics, Vibrations, Controls and Mechatronics

MAE 513 Principles of Structural Vibration
MAE 518 Acoustic Radiation I
MAE 521 Linear Control & Design for MIMO
MAE 524 Principles of Mechatronic Control
MAE 534 Mechatronics Design
MAE 535 Design of Electromechanical Systems

MAE 544 Real Time Robotics

Structural Mechanics and Materials

MAE 533 Finite Element Analysis I
MAE 537 Mechanics of Composite Structures
MAE 545 Metrology for Precision Manufacturing
MAE 541 Advanced Machine Design I
MAE 543 Fracture Mechanics
MAE 742 Mechanical Design for Automated Assembly

Other recommended courses

MAE 575 Advanced Propulsion
MAE 589Q Design for Strength & Endurance
MAE 589W Smart Materials
MAE 589Z Mechanical Design Engineering
MAE 704 Fluid Dynamics of Combustion II
MA 501 Adv. Mathematics for Engineers & Scientists I
MA 502 Adv. Mathematics for Engineers & Scientists II

Master of Science in Chemical Engineering

Program Requirements: The student must complete a total of 30 credit hours at the graduate level. Completion of four core courses in Chemical Engineering is required. The remaining six courses should be taken from Chemical and Biomolecular Engineering (preferably) or from any graduate level engineering, mathematics or statistics courses offered through Engineering Online.

Chemical Engineering Core Courses

CHE 711 Chemical Engineering Process Modeling
CHE 713 Thermodynamics I
CHE 717 Chemical Reaction Engineering
CHE 596U Fundamentals of Transport Phenomena

Other Courses Available Online

CHE 543 Polymer Science and Technology
CHE 551 Biochemical Engineering
CHE 575 Advances in Pollution Prevention: Environmental Management
CHE 596A Life Cycle Analysis
CHE 596I Colloid Science Engineering
CHE 589M Multi-Scale Modeling of Fluids & Soft Matter
CHE 597C Chemical Engineering Projects: Polymer Interfaces and in Confined Geometries
CHE 598K Polymer Rheology and Processing
CHE 718 Advanced Chemical Reaction Engineering
MA 501 Adv. Mathematics for Engineers & Scientists I
MA 502 Adv. Mathematics for Engineers & Scientists II