E SC Technical Electives

A total of four Technical Elective (TE) courses are required.

**Engineering Courses (select 2–4 courses)**

Courses in **boldface type** can be used as *either* as a Technical Elective or as a Foundational Elective.

- AERSP 412 (Turbulent Flow)
- AERSP 424 (Advanced Computer Programming)
- AERSP 440 (Introduction to Software Engineering for Aerospace Engineers)
- AERSP 460 (Aerospace Control Systems)
- AERSP 473 (Composites Processing)
- AERSP 490 (Introduction to Plasmas)
- AERSP 492 (Space Astronomy and Introduction to Space Science)
- A E 421 (Architectural Structural Systems I)
- A E 424 (Environmental Control Systems I)
- A E 430 (Indeterminate Structures)
- A E 456 (Solar Energy Building System Design)
- A E 461 (Architectural Illumination Systems & Design)
- A E 464 (Advanced Architectural Illumination Systems & Design)
- A E 467 (Advanced Building Electrical System Design)
- A E 470 (Residential Building Design and Construction)
- BME 402 (Biomedical Instrumentation and Measurements)
- BME 406 (Medical Imaging)
- **BME 409 (Biofluid Mechanics)**
- BME 410 (Biomedical Applications of Microfluidics)
- BME 413 (Mass Transport in Biological Systems)
- BME 419 (Artificial Organs and Prosthetic Devices)
- BME 423 (Reaction Kinetics of Biological Systems)
- BME 443 (Biomedical Materials)
- BME 444 (Surfaces and the Biological Response to Materials)
- BME 445 (Tissue Engineering: Concepts, Calculations and Applications)
- B E 461 (Design of Fluid Power Systems)
- B E 465 (Food and Biological Process Engineering)
- B E 467 (Design of Stormwater and Erosion Control Facilities)
- B E 468 (Microbiological Engineering)
- B E 477 (Land-Based Waste Disposal)
- B E 487 (Watershed Modeling for Water Quality Design)
- CH E 350 (Process Heat Transfer)
- CH E 432 (Petroleum Processing)
- CH E 438 (Bioprocess Engineering)
- CH E 442 (Polymer Processing Technology)
- C E 447 (Structural Analysis by Matrix Methods)
- C E 461 (Water-resource Engineering)
- C E 462 (Open Channel Hydraulics)
- C E 475 (Water Quality Chemistry)
- C E 479 (Environmental Microbiology for Engineers)
- CMPEN 416 (Digital Integrated Circuits)
- CMPEN 417 (Digital Design Using Field Programmable Devices)
- CMPEN 431 (Introduction to Computer Architecture)
- CMPEN 441 (Operating Systems)
- CMPEN 454 (Fundamentals of Computer Vision)
- CMPEN 455 (Digital Image Processing)
- CMPEN 461 (Communication Networks)
- CMPEN 471 (Logical Design of Digital Systems)
- CMPEN 472 (Microprocessors and Embedded Systems)
- CMPEN 475 (Functional Verification)
- CMPSC 402 (UNIX and C)
- CMPSC 421 (Net-centric Computing)
- CMPSC 426 (Object-oriented Design)
- CMPSC 428 (Programming in Ada)
- CMPSC 430 (Database Design)
- CMPSC 43!W (Database Management Systems)
- CMPSC 436 (Communications and Networking)
- CMPSC 438 (Computer Network Architecture and Programming)
- CMPSC 441 (Artificial Intelligence)
- CMPSC 442 (Artificial Intelligence)
- CMPSC 444 (Machine Learning and Algorithmic AI)
- CMPSC 450 (Concurrent Scientific Programming)
- CMPSC 456 (Introduction to Numerical Analysis II)
- CMPSC 457 (Computer Graphics Algorithms)
- CMPSC 458 (Fundamentals of Computer Graphics)
- CMPSC 459 (Scientific Visualization)
- CMPSC 461 (Programming Language Concepts)
- CMPSC 462 (Data Structures)
- CMPSC 463 (Design and Analysis of Algorithms)
- CMPSC 464 (Introduction to the Theory of Computation)
- CMPSC 465 (Data Structures and Algorithms)
- CMPSC 467 (Factorization and Primality Testing)
- CMPSC 469 (Formal Languages with Applications)
- CMPSC 471 (Introduction to Compiler Construction)
- CMPSC 473 (Operating Systems Design & Construction)
- CMPSC 474 (Operating System & Systems Programming)
• CMPSC 479 (Language Translation)
• EE 413 (Power Electronics)
• EE 416 (Digital Integrated Circuits)
• EE 417 (Digital Design Using Field Programmable Devices)
• EE 420 (Electro-optics: Principles and Devices)
• EE 422 (Optical Engineering Laboratory)
• EE 424 (Principles and Applications of Lasers)
• EE 430 (Principles of Electromagnetic Fields)
• EE 432 (RF and Microwave Engineering)
• EE 438 (Antenna Engineering)
• EE 439 (Radiowave Propagation in Communications)
• EE 441 (Semiconductor Integrated Circuit Technology)
• EE 442 (Solid State Devices)
• EE 450 (Signal and Image Processing)
• EE 453 (Fundamentals of Digital Signal Processing)
• EE 454 (Fundamentals of Computer Vision)
• EE 455 (An Introduction to Digital Image Processing)
• EE 456 (Introduction to Neural Networks)
• EE 458 (Digital Image Processing and Computer Vision)
• EE 460 (Communication Systems II)
• EE 461 (Communications I)
• EE 471 (Introduction to Plasmas)
• EE 472 (Space Astronomy and Introduction to Space Science)
• EE 474 (Satellite Communications Systems)
• EE 477 (Fundamentals of Remote Sensing Systems)
• EE 481 (Control Systems)
• EE 483 (Introduction to Automation and Robotics Systems)
• EE 484 (Control System Design)
• EEGE 411 (Energy Science and Engineering Lab)
• EEGE 412 (Green Engineering & Environmental Compliance)
• EEGE 420 (Hydrogen and Fuel Cells)
• EEGE 430 (Introduction to Combustion)
• EEGE 433 (Physical Processes in Energy Engineering)
• EEGE 436 (Modern Thermodynamics for Energy Systems)
• EEGE 437 (Design of Solar Energy Conversion Systems)
• EEGE 438 (Wind and Hydropower Energy Conversion)
• EEGE 441 (Electrochemical Engineering Fundamentals)
• EEGE 451 (Energy Conversion Processes)
• EEGE 455 (Materials for Energy Applications)
• EEGE 456 (Introduction to Neural Networks)
• EEGE 470 (Air Pollutants from Combustion Sources)
• EM 407 (Electrochemical Energy Storage)
• ENGR 421 (Materials Properties Measurements II)
• ENGR 450 (Materials Design and Applications)
• EDSGN 401 (Engineering Systems Design)
• EDSGN 452 (Projects in Humanitarian Engineering)
• EDSGN 479 (Human Centered Product Design and Innovation)
• E MCH 400 (Advanced Strength of Materials and Design)
• E MCH 402 (Applied and Experimental Stress Analysis)
• E MCH 403 (Strength Design in Materials and Structures)
• E MCH 409 (Advanced Mechanics)
• E MCH 416 (Failure and Failure Analysis of Solids)
• E MCH 440 (Nondestructive Evaluation of Flaws)
• E MCH 446 (Mechanics of Viscoelastic Materials)
• E MCH 461 (Finite Elements in Engineering)
• E MCH 470 (Analysis and Design in Vibration Engineering)
• E MCH 471 (Engineering Composite Materials)
• E MCH 473 (Composites Processing)
• E SC 400H (Electromagnetic Fields)
• E SC 417 (Electrical and Magnetic Properties)
• E SC 419 (Electronic Properties and Applications of Materials)
• E SC 445 (Semiconductor Optoelectronic Devices)
• E SC 450 (Synthesis and Processing of Electronic and Photonic Materials)
• E SC 455 (Electrochemical Methods Engineering and Corrosion Science)
• E SC 456 (Introduction to Neural Networks)
• E SC 475 (Particulate Materials Processing)
• E SC 481 (Elements of Nano/Micro-electromechanical Systems Processing and Design)
• E SC 482 (Micro-Optoelectromechanical Systems (MOEMS) and Nanophotonics)
• E SC 483 (Simulation and Design of Nanostructures)
• E SC 484 (Biologically Inspired Nanomaterials)
• ENVE 417 (Hydraulic Design)
• ENVE 424 (Solid Waste Management)
• ENVE 470 (Air Quality)
• ENVSE 404W (Surface and Interfacial Phenomena in Environmental Systems)
• ENVSE 440 (Industrial Ventilation for Contaminant Control)
• ENVSE 470 (Systems Safety and Risk Engineering)
• I E 405 (Deterministic Models in Operations Research)
• I E 408 (Cognitive Work Design)
• I E 418 (Human/Computer Interface Design)
• I E 419 (Work Design - Productivity and Safety)
• I E 424 (Process Quality Engineering)
• I E 425 (Stochastic Models in Operations Research)
• I E 428 (Metal Casting)
• I E 433 (Regression Analysis and Design of Experiments)
• I E 434 (Statistical Quality Control)
Other Courses (select 0–2 courses)

- CHEM 212 (Organic Chemistry II)
- CHEM 402 (Chemistry in the Environment)
- CHEM 456 (Nuclear and Radiochemistry)
- CHEM 452 (Physical Chemistry - Quantum Chemistry)
- CHEM 466 (Molecular Thermodynamics)
- CHEM 472 (General Biochemistry I)
- F SC 431 (The Chemistry of Fuels)
- MATH 419 (Theoretical Mechanics)
- MATH 450 (Mathematical Modeling)
- MATH 461 (Theoretical Mechanics)
- METEO 421 (Atmospheric Dynamics)
- METEO 436 (Radiation and Climate)
- METEO 477 (Fundamentals of Remote Sensing Systems)

- PHYS 406 (Subatomic Physics)
- PHYS 410 (Introduction to Quantum Mechanics I)
- PHYS 411 (Introduction to Quantum Mechanics II)
- PHYS 412 (Solid State Physics I)
- PHYS 414 (Solid State Physics)
- PHYS 419 (Theoretical Mechanics)
- PHYS 421W (Research Methods in Physics)
- PHYS 443 (Intermediate Acoustics)
- PHYS 457W (Experimental Physics)
- PHYS 458 (Intermediate Optics)
- PHYS 461 (Theoretical Mechanics)
- PHYS 462 (Applications of Physics in Medicine)
- PHYS 472 (Elements of Nuclear Physics and its Applications to Medical Imaging and Treatments)

Only one of the following may be used to fulfill a technical elective requirement

- ENGR 295 + 395 + 495 — student must complete all three co-op rotations
- 3 credits of coursework required for a minor — student must complete the minor
- EDSGN 4xx (Solid Works/Advanced CAD)

Exceptions for technical electives not included on this list will be considered by department petition.

Note: Some of these courses may be enrollment controlled for students in that major. In these cases, please check with the specific department to determine their policy on letting students from other majors enroll in their courses.