

# Materials Engineering

A minimum of 20 of the required 28 units should be Materials Science (MASC) or Materials Science cross-listed courses. Any course not on the list will require department approval to be applied toward the degree.

## MASC elective list (20-28 units)

- MASC 501 Solid State (3)
- MASC 502 Advanced Solid State (3)
- MASC 503 Thermodynamics of Materials (4)
- MASC 504 Diffusion and Phase Equilibria (4)
- MASC 505 Crystals and Anisotropy (4)
- MASC 506 Semiconductor Physics (4)
- MASC 512 Thin Film Science and Technology (4)
- MASC 515 Basics of Machine Learning for materials (4)
- MASC 520 Mathematical Methods for Deep Learning (4)
- MASC 534 Materials Characterization (3)
- MASC 535L Transmission Electron Microscopy (4)
- MASC 551 Mechanical Behavior of Engineering Materials (4)
- MASC 559 Creep (3)
- MASC 560 Fatigue and Fracture (3)
- MASC 561 Dislocation Theory and Applications (3)
- MASC 562 Failure Analysis (3)
- MASC 564 Composite Processing (4)
- MASC 570 Introduction to Photovoltaic Solar Energy Conversion (3)
- MASC 575 Basics of Atomistic Simulation of Materials (4)
- MASC 576 Molecular Dynamics Simulations of Materials and Processes (4)
- MASC 583 Materials Selection (4)
- MASC 599 Special Topics (varies)
- MASC 601 Advanced Semiconductor Device Physics (4)
- MASC 610 Molecular Beam Epitaxy

## ENG elective list (0-8 units)

- AME 503 Advanced Mechanical Design
- AME 508 Machine Learning and Computational Physics
- AME 509 Applied Elasticity
- AME 525 Engineering Analysis
- AME 526 Engineering Analytical Methods
- AME 546 Design for Manufacturing and Assembly
- AME 577 Survey of Energy and Power for a Sustainable Future
- AME 578 Modern Alternative Energy Conversion Devices
- AME 588 Materials Selection
- ASTE 557 Spacecraft Structural Strength and Materials
- BME 510 Cellular Systems Engineering
- CE 507 Mechanics of Solids I
- CE 529a Finite Element Analysis
- CE 546 Structural Mechanics of Composite Materials
- CHE 501 Modeling and Analysis of Chemical Engineering Systems
- CHEM 630 Fundamentals of Electrochemical Energy Systems
- CHEM 632 Introduction to Surface Chemistry and Electrocatalysis
- EE 471 (MASC 471) Applied Quantum Mechanics for Engineers (4)
- EE 504L Solid State Processing and Integrated Circuits Laboratory
- EE 507 (MASC 507) Micro- and Nano-Fabrication Technology
- EE 508 (MASC 508) Nano-Fabrication Lithography
- EE 512 Stochastic Processes
- EE 529 Optics
- EE 531 Non-linear Optics
- EE 537 Modern Solid-State Devices
- EE 601 Semiconductor Devices
- EE 607 Microelectromechanical Systems
- EE 612 Science and Practice of Nanotechnology
- ENE 505 Energy and the Environment
- ISE 510 Advanced Computational Design and Manufacturing
- ISE 515 Engineering Project Management
- PTE 586 Artificial Intelligence and Machine Learning in Oilfield Operations (3)