MATERIALS SCIENCE & ENGINEERING
APPROVED LIST OF "ELECTIVES" FOR GRADUATE STUDENTS

MECHANICAL ENGINEERING

530.601  Continuum mechanics
530.604  Mechanical Properties
530.605/606  Mechanics of solids & materials I & II
530.612  Computational solid mechanics
530.631  Conduction and Radiation of Heat
530.632  Convection of heat and mass
530.640  Statistical mechanics and molecular dynamics
530.642  Plasticity
530.646  Robot Devices, Kinematics, Dynamics, and Control
530.644  Mechanics of composite materials
530.652  Bridge length scales in materials behavior
530.655  Additive Manufacturing (Graduate)
530.656  Deformation Mechanisms
530.671  Statistical mechanics in biological systems
530.684  Orientation Mapping of Crystalline Materials
530.730  Finite element methods
530.732  Fracture of materials
530.733  Microelectromechanical systems
530.748  Stress waves in solids
530.751  Finite elasticity
530.753  Fatigue
530.754  Viscoelasticity
530.756  Advanced analytical electron microscopy
530.757  Nanomechanics
530.766  Numerical Methods

BIOMEDICAL ENGINEERING

580.642  Tissue Engineering
580.774  Molecular & Cellular Imaging

CIVIL ENGINEERING

560.728  Stochastic Micromechanics
560.730  Finite element methods
560.731  Theoretical methods in computational mechanics
560.733  Computational plasticity
560.735  Finite element methods in solid mechanics
560.737  Wave Propagation
**CHEMICAL & BIOMOLECULAR ENGINEERING**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>540.622</td>
<td>Introduction to Polymeric Materials</td>
</tr>
<tr>
<td>540.623</td>
<td>Phase equilibria</td>
</tr>
<tr>
<td>540.624</td>
<td>Applied statistical thermodynamics</td>
</tr>
<tr>
<td>540.626</td>
<td>Introduction to biomacromolecules</td>
</tr>
<tr>
<td>540.630</td>
<td>Thermodynamics, Statistical Mechanics &amp; Kinetics</td>
</tr>
<tr>
<td>540.633</td>
<td>Engineering aspects of controlled drug delivery</td>
</tr>
<tr>
<td>540.637</td>
<td>Application of molecular evolution in biotechnology</td>
</tr>
<tr>
<td>540.652</td>
<td>Fundamentals of Biotransport Phenomena (formerly 540.651 - Advanced transport phenomena)</td>
</tr>
<tr>
<td>540.440/540.640</td>
<td>Micro &amp; Nanotechnology</td>
</tr>
<tr>
<td>540.603</td>
<td>Colloids and Nanoparticles</td>
</tr>
<tr>
<td>540.660</td>
<td>Polymer Physics</td>
</tr>
<tr>
<td>540.662</td>
<td>Polymer Design and Bioconjugation</td>
</tr>
</tbody>
</table>

**COMPUTER SCIENCE**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>601.615</td>
<td>Databases</td>
</tr>
</tbody>
</table>

**ELECTRICAL & COMPUTER ENGINEERING**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>520.603</td>
<td>Electromagnetic Waves and Radiating Systems</td>
</tr>
<tr>
<td>520.604</td>
<td>Computational Electromagnetics</td>
</tr>
<tr>
<td>520.605/606</td>
<td>Introduction to Solid State Physics</td>
</tr>
<tr>
<td>520.610</td>
<td>Computational Functional Genomics</td>
</tr>
<tr>
<td>520.619</td>
<td>Optical Communications</td>
</tr>
<tr>
<td>520.607</td>
<td>Intro to the Physics of Electronic Devices</td>
</tr>
<tr>
<td>520.621</td>
<td>Introduction to Nonlinear Systems</td>
</tr>
<tr>
<td>520.623</td>
<td>Optical Propagation, Backgrounds and Sensing</td>
</tr>
<tr>
<td>520.627</td>
<td>Photovoltaics and Energy Devices</td>
</tr>
<tr>
<td>520.653</td>
<td>Fundamental Non-linear Optics</td>
</tr>
<tr>
<td>520.691</td>
<td>Optoelectronic VLSI</td>
</tr>
<tr>
<td>520.725</td>
<td>Medical Microsystems</td>
</tr>
<tr>
<td>520.727/728</td>
<td>Quantum electronic</td>
</tr>
<tr>
<td>520.745</td>
<td>Solid state electronics</td>
</tr>
<tr>
<td>520.765</td>
<td>Nonlinear Waves and Interactions in Optics and Electrodynamics</td>
</tr>
<tr>
<td>520.773</td>
<td>Advanced topics in fabrication and microengineering</td>
</tr>
<tr>
<td>520.776</td>
<td>Learning on Silicon</td>
</tr>
</tbody>
</table>
GEOGRAPHY & ENVIRONMENTAL ENGINEERING

570.661  Applied Mathematics for Engineering/Cross Listed with 531.661
570.686  Multiscale Flow and Transport in Porous Media

INBT (Institute for NanoBioTechnology)

670.621  NanoBioLaboratory
670.619  Fundamental Physics & Chemistry of NanoMaterials

PHYSICS

171.605.606  Quantum mechanics
171.621-622  Condensed matter physics (including advanced, experimental, topics in...)
171.634  Magnetism
171.703-704  Advanced statistical mechanics
173.712  Laboratory of advanced instrumentation

EARTH & PLANETARY SCIENCES

270.621-622  Transmission electron microscopy
270.635  Crystal chemistry and behavior of rocking-forming minerals
270.641  Inorganic solids
270.647  Mechanics of Earth’s interior

CHEMISTRY

030.451  Spectroscopy (graduate version is taught but is not listed separately)
030.601  Statistical mechanics
030.607  Surface and interface chemistry
030.603  Organic Photochemistry
030.610  Chemical Kinetics
030.611  Electron Transfer Processes
030.615  Topics in biological inorganic chemistry
030.620  Chemical Biology II
030.631  Bioorganic chemistry
030.635  Methods in Nuclear Magnetic Resonance
030.681  Organometallic Chemistry
BIOPHYSICS

250.685 Proteins and nucleic acids
250.689 Physical chemistry of biological macromolecules
250.690 Methods in molecular biophysics

BIOLOGY

020.637 Advanced Genetics and Development
020.639 Macromolecular assemblies in biology
020.642 Proteins: structure, folding and interaction with partners
020.646 Biological Spectroscopy
020.667 Bioconjugate Techniques
020.679 Advanced Biological Electron Microscopy
020.735 Membrane Trafficking

APPLIED MATHEMATICS & STATISTICS

553.740 Machine Learning
553.636 Introduction to Data Science

AS.410.603 Advanced Cell Biology – AAP Biotechnology

661.610 Research Writing

All other courses need to be approved by either the Master’s Program Committee (MSE) or the Doctoral Program Committee (Ph.D.) in order to be counted as Materials Science & Engineering electives.