

Materials Science & Engineering PhD Program (MSEP)

MSEP Approved CORE classes

	CATEGORY	Course #/ title	Normally offered
0	Mandatory core	MATSE/MSE 505 – Advanced Materials	F – annually
1	Thermodynamics/ Kinetics	CHEM 531 – Advanced Physical Chemistry I MATSE/MSE 516 – Phase Transformations ME 526 – Statistical Thermodynamics ME/CHE 527 – Macroscopic Thermodynamics MSE/ME 514 – Thermodynamics of solids PHYS 533 – Thermal and Statistical Physics I PHYS 534 – Thermal and Statistical Physics II	F – annually S – even years S – odd years S – even years (UI) F – even years S – annually S – annually
2	Solid State	CHEM 480 – Solid State Chemistry EE 496 – Semiconductor Devices MSE 515 – Electronic Properties of Materials PHYS 463 – Introduction to Solid State & Materials Physics PHYS 563 – Physics of the Solid State	F – odd years F – annually F – even years S – annually F – annually
3	Quantum Mechanics	CHEM 532 – Advanced Physical Chemistry II # CHEM 534 – Chemical Statistical Mechanics CHEM 564 – Molecular Phenomena PHYS 450 – Introduction to Quantum Mechanics PHYS 550 – Quantum Theory I	F – annually S – odd years S – even years F – annually F – annually
4	Materials Processing	MSE 404 – Engineering Composites MSE 508 – Polymer Nanocomposites and Functionalities MSE 523 – Ceramics Processing MSE 543/CE 593 – Polymer Materials and Engineering MSE 544/CE 593 – Natural Fibers MSE 545/CE 595 – Polymer and Composite Processing MSE 546/CE 596 – Engineered Wood Composites MSE/ME 507 – Additive Manufacturing	S – annually F – odd years S – even years S – even years F – odd years S – odd years F – even years F – odd years
5	Materials Characterization	CHEM 514 – Mass Spectrometry CHEM 535 – Applied Spectroscopy MATSE 571 – Microscopic Analysis of Solid Surfaces	F – odd years F – annually S – annually
6	Advanced Chemistry	CHEM 501 – Advanced Inorganic Chemistry I CHEM 520 – Advanced Analytical Chemistry CHEM 521 – Radiochemistry CHEM 532 – Advanced Physical Chemistry II # CHEM 542 – Advanced Organic Chemistry	S – odd years F – odd years F – even years F – annually F – annually
7	Solid Mechanics	CE 514 – Advanced Mechanics of Materials MATSE/MSE/ME 513 – Crystal Plasticity ME 501 – Continuum Mechanics ME/BioEng 525 – Biomechanics MSE/ME 520 – Multiscale Modeling Thermomech. Mater. MSE/ME 530 – Elasticity MSE/ME 531 – Theory of Plasticity MSE/ME 534 – Mechanics of Composite Materials MSE/ME 537 – Fracture Mechanics and Mechanisms	F – annually F – even years F – even years S – odd years S – even years F – odd years S – even years F – odd years S – odd years
8	Transport	CHE 510 – Transport Processes ME 515 – Advanced Heat Transfer ME 516 – Conduction and Radiation Heat Transfer ME 521 – Fundamentals of Fluids I ME 556 – Numerical Modeling in Fluid Mechanics	F – annually S – even years F – odd years F – even years F – odd years
9	Multi-component Systems	CHE 585 – Interfacial Phenomena MATSE/MSE 506 – Biomaterials MSE /ME 517 – Thin Films	S – even years F – odd years S – odd years
10	Applied mathematics	MATH 540 – Applied Mathematics I MATSE/MSE 521 – Statistics of Microstructures PHYS 571 – Methods of Theoretical Physics STAT 512 – Design and Analysis of Experiments STAT 523 – Statistical Methods for Engineers and Scientists	F,S – annually S – odd years* F – annually F, S – annually S – annually

*irregularly offered; #cannot be counted for two categories