

MATERIALS SCIENCE AND ENGINEERING, PH.D

Graduate Program Director: David Jack

Baylor offers a Doctor of Philosophy in Materials Science and Engineering, allowing students to work with faculty across departmental boundaries. Materials Science and Engineering is multidisciplinary in nature, crossing traditional departmental specializations. Students, along with their interdisciplinary dissertation committee, will select from a wide variety of courses and research areas allowing students to establish expertise crossing traditional disciplinary lines. Baylor's Materials Science and Engineering program specializes in two pillars of national need: Advanced Structural and Multifunctional Materials and Optical and Quantum Materials. The program is research-intensive and designed to prepare students for future careers in industry, federal laboratories, and academia.

Admission

Students applying to the MSE program must have an exceptional academic record, a Bachelor of Science (B.S.) or Master of Science (M.S.) from an engineering or science degree program, and evidence of research experience. Tuition waivers and stipends will be available on a competitive basis. Student applications will be reviewed by the graduate program committee for Materials Science and Engineering program.

General requirements for the Doctor of Philosophy degree are given in the general requirements section of this catalog. It is not necessary that students with the B.S. degree obtain an M.S. degree before pursuing the doctorate. As the Materials Science and Engineering program is inherently cross-disciplinary, there is considerable latitude given to the student, their academic advisor, and their dissertation committee in selecting a course of study combining both coursework and research hours.

Code	Title	Hours
Core Competency 6		
Students select two classes from Core Competency 1 or two classes from Core Competency 2. Students must receive a B (GPA 3.0) or better for a course to satisfy the core competency requirement.		
<i>Structural and Multifunctional Materials - Core Competency Area 1</i>		
EGR/ELC/ME 5302	Engineering Analysis	
ME 5344	Viscoelasticity	
ME 5351	Intermediate Numerical Methods	
ME 5352	Theory of Elasticity	
ME 5353	Continuum Mechanics	
ME 5364	Introduction to Additive Manufacturing	
ME 5365	Properties and Processing of Electronic Materials	
ME 5383	Deformation and Fracture in Metals	
ME 5385	Failure Analysis: Theory and Practice	
PHY 5340	Statistical Mechanics	
PHY 5342	Solid State Physics	
<i>Quantum and Optical Materials - Core Competency Area 2</i>		
BIO 5420	Transmission Electron Microscopy	
BIO 5421	Scanning Electron Microscopy	

CHE 5310	Advanced Chemical Instrumentation	
CHE 5325	Quantum Chemistry	
CHE 5336	Advanced Synthesis and Natural Products	
CHE 5380	Principles of Biochemistry	
ELC 5396	Special Topics in Engineering	
PHY 5330	Electromagnetic Theory I	
PHY 5342	Solid State Physics	
PHY 5370	Quantum Mechanics I	
Electives		15
Choose a minimum of 15 additional hours, beyond those taken for the core competency, from the following list:		
BIO 5420	Transmission Electron Microscopy	
BIO 5421	Scanning Electron Microscopy	
CHE 5304	Special Topics in Inorganic Chemistry	
CHE 5310	Advanced Chemical Instrumentation	
CHE 5320	Thermodynamics and Statistical Thermodynamics	
CHE 5322	Chemical Kinetics and Mechanisms	
CHE 5325	Quantum Chemistry	
CHE 5326	Lasers and Molecular Spectroscopy	
EGR 5302	Engineering Analysis	
ELC 5336	Advanced Engineering Electromagnetics	
ELC 5337	Principles of Microwave Sensing and Measurement	
ELC 5396	Special Topics in Engineering	
ME 5344	Viscoelasticity	
ME 5351	Intermediate Numerical Methods	
ME 5352	Theory of Elasticity	
ME 5353	Continuum Mechanics	
ME 5364	Introduction to Additive Manufacturing	
ME 5365	Properties and Processing of Electronic Materials	
ME 5382	Mechanical Behavior of Polymers and Polymeric Composites	
ME 5383	Deformation and Fracture in Metals	
ME 5385	Failure Analysis: Theory and Practice	
ME 5396	Special Topics in Engineering	
PHY 5320	Classical Mechanics I	
PHY 5330	Electromagnetic Theory I	
PHY 5331	Electromagnetic Theory II	
PHY 5340	Statistical Mechanics	
PHY 5342	Solid State Physics	
PHY 5360	Mathematical Physics I	
PHY 5361	Mathematical Physics II	
PHY 5370	Quantum Mechanics I	
PHY 5371	Quantum Mechanics II	
PHY 5321	Classical Mechanics II	
Research and Colloquium		
Students must enroll in the colloquium series for a minimum of 4 semesters.		
MSE 5101	Materials Science and Engineering Colloquium	4

MSE 6V99	Dissertation - Materials Science and Engineering	12
Additional Research and Electives		23
<p>Students must take an additional 23 credit hours, the makeup of which will be determined by the student's dissertation committee. These hours may include a combination of Materials Science and Engineering Research (MSE 6V97), dissertation research (MSE 6V99) and graduate coursework.</p>		
Total Hours		60