

MATERIALS SCIENCE AND ENGINEERING

Materials Science and Engineering is concerned with the relation between the structure and properties of materials. One important goal of this work involves the development of processes for altering the structure of materials and thereby controlling their properties. This field brings together, in a unified discipline, developments in Physical Metallurgy, Ceramics, Physics, and Chemistry which can be, and in fact are, applied to modern problems of technological, engineering, and scientific significance.

Students who are interested in both science and its application to important technological problems should consider a career in Materials Science and Engineering. The Undergraduate Program described here has a dual function. It provides basic training for those who wish to become materials engineers, and it provides a foundation for more advanced work in the field. Such advanced study enables students to respond effectively to technological change. Able students are encouraged to take at least one year of graduate study to extend their coursework and to obtain training in research. Co-terminal degree programs are recommended for both undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines. Current research strengths of the Department include transmission electron microscopy, microelectronic materials science, structure and properties of thin film materials, semiconductors, magnetic materials, photoelectronic materials, mechanics and mechanical properties of solids, computer modelling of materials behavior and processing of metals and alloys.

Students who wish to receive further information about the programs in Materials Science and Engineering should contact:

Professor John C. Bravman, Chair
Department of Materials Science and Engineering
Building 550 (Mail Stop 2205)
Stanford University
Stanford, CA
94305-2205

REQUIREMENTS FOR UNDERGRADUATES IN MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS AND SCIENCE (A MINIMUM COMBINATION OF 40 UNITS)

Math (approved courses): 20 Units Minimum
Science (approved courses): 20 Units Minimum

TECHNOLOGY IN SOCIETY (1 COURSE)

One course from School of Engineering approved list

ENGINEERING FUNDAMENTALS & DEPTH (MINIMUM 65 UNITS COMBINED)

FUNDAMENTALS (5 COURSES FROM THE FOLLOWING LIST:)

E 14: Statics - or - E15: Intermediate Dynamics
E 20: Introduction to Chemical Engineering
E 30: Engineering Thermodynamics
E 40: Basic Electronics
E 50: Introduction to Science of Materials
E 60: Engineering Economy - or - E62: Introduction to Op. Research. 1
E 70A: Introduction to Software Engineering (enroll in CS 106A) or
E 70X: (enroll in CS 106X)

DEPTH (46 UNITS REQUIRED)

MSE 151	Microstructure and Mechanical Properties	03 Units
MSE 152	Electronic Materials Engineering	03 Units
MSE 161 **	Materials Science Labs. I	03 Units
MSE 162	Materials Science Labs. II	02 Units
MSE 163	Materials Science Labs. III	02 Units
<i>MSE Fundamentals</i>	Materials Science Fundamentals	24 Units
<i>Option Courses</i>	Science and Engineering Options	09 Units

MSE FUNDAMENTALS (24 units) (choose six courses from the following)

MSE 191	Mathematical & Computational Methods in Mat. Sci.	04 Units
MSE 192	Solid State Thermodynamics	04 Units
MSE 193	Atomic Arrangements in Solids	04 Units
MSE 194	Phase Equilibria	04 Units
MSE 195	Waves and Diffraction in Solids	04 Units
MSE 196	Imperfections in Crystalline Solids	04 Units
MSE 197	Rate Processes in Materials	04 Units
MSE 198	Mechanical Properties of Materials	04 Units
MSE 199	Electrical and Magnetic Properties of Materials	04 Units

** Writing in the Major Requirement

OPTIONS (choose 9 units from one of the following options)

Physics Option (select 9 units from the following)

Phys 110, 111	Intermediate Mechanics	6 Units
Phys 120,121,122	Intermediate Electricity and Magnetism	9 Units
Phys 130,131,132	Quantum Mechanics	9 Units
Phys 170,171,172	Stat. Mech and Physics of Solids	9 Units

Chemistry Option (select 9 units from the following)

Chem 151,153	Inorganic Chemistry	6 Units
Chem 171,173,175	Physical Chemistry	9 Units

Chemical Engineering Option (select 9 units from the following)

Engr 20	Introduction to Chem Engr	3 Units
Mech Engr 33	Mechanics of Fluids	4 Units
Chem Engr 110	Equilibrium Thermodynamics	3 Units
Chem Engr 130	Design of Chemical Reactions	3 Units
Chem Engr 140	Fluid Mechanics	3 Units
Chem Engr 150	Energy and Mass Transport	3 Units
Chem Engr 170	Polymer Science and Engineering	3 Units

Electrical Engineering Option (select 9 units from the following)

Engr 40	Introductory Electronics	5 Units
Elec Engr 101,102	Circuits and Systems	6 Units
Elec Engr 111,112	Electronics	6 Units
Elec Engr 113	Electronic Circuits	3 Units
Elec Engr 141,142	Electromagnetic Fundamentals and Waves	6 Units

Mechanical Engineering Option (select 9 units from the following)

Engr 14	Mechanics of Materials	5 Units
Engr 15	Intermediate Dynamics	5 Units
Mech Engr 33	Mechanics of Fluids	4 Units
Mech Engr 103	Manufacturing and Design	4 Units
Mech Engr 111	Stress, Strain and Strength	3 Units
Mech Engr 131A	Fluid Mechanics	4 Units
Mech Engr 131B	Heat Transfer	5 Units
Mech Engr 161	Mechanical Vibrations	4 Units

Self-Defined Option (must contain 9 units)

Student may petition for approval of a self-defined option containing a minimum of 9 units which comprise a cohesive program of study.