

MSE - Materials Science and Engineering

Materials Science and Engineering: MSE

Lower-Division Courses

Upper-Division Courses

MSE 360M. Experiments in Materials Science and Engineering.

Same as Engineering Studies 360M. Hands-on lab-based course designed to teach practical techniques in the synthesis and characterization of materials and their properties, and to use experiments to explore fundamental and potentially abstract materials concepts. Four-and-one-half laboratory hours a week for one semester. Only one of the following may be counted: Engineering Studies 360M, 377 (Topic: Experiments in Materials Science and Engineering), Materials Science and Engineering 360M. Prerequisite: Chemistry 301, Math 408C, 408D and 427J, and Physics 303K and 303L. For students in majors that offer an introductory materials science and engineering course, it is advised to take it prior to taking this course.

Graduate Courses

MSE 386P. Topics in Materials Science: Fundamentals.

Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing and consent of instructor; additional prerequisites may vary with the topic.

Topic 1: Introduction to Phase Transformations. Same as Mechanical Engineering 386P (Topic 1). Basics of crystal structures and phase diagrams; diffusion; solidification; solid-state phase transformations. Mechanical Engineering 386P (Topic 1) and Materials Science and Engineering 386P (Topic 1) may not both be counted.

Topic 2: Mechanical Behavior of Materials. Same as Mechanical Engineering 386P (Topic 2). Elastic deformation; viscoelasticity; yielding, plastic flow, plastic instability; strengthening mechanisms; fracture, fatigue, creep; significance of mechanical properties tests. Microstructural mechanisms and macroscopic behavior of metals, polymers, ceramics, and composites. Mechanical Engineering 386P (Topic 2) and Materials Science and Engineering 386P (Topic 2) may not both be counted.

Topic 3: Introduction to Thermodynamics of Materials. Same as Mechanical Engineering 386P (Topic 3). Thermodynamic properties; reactions and chemical equilibrium in gases; solutions, phase equilibria, phase diagrams, reaction equilibria; surfaces and interfaces; point defects in crystals. Mechanical Engineering 386P (Topic 3) and Materials Science and Engineering 386P (Topic 3) may not both be counted.

Topic 4: Introduction to Solid-State Properties of Materials. Same as Electrical and Computer Engineering 396V (Topic 5) and Mechanical Engineering 386P (Topic 4). Introduction to the electronic, magnetic, and optical properties of materials. Solid-state properties of metals, semiconductors, and ceramics; fundamental concepts needed for the description of these properties, using an introductory-level description of the electronic structure of solids. Only one of the following may be counted: Electrical Engineering 396V (Topic 5), Electrical and Computer Engineering 396V (Topic 5), Mechanical Engineering 386P (Topic 4), Materials Science and Engineering 386P (Topic 4). Additional prerequisite: Graduate standing and consent of instructor.

Topic 5: Structure of Materials. Same as Mechanical Engineering 386P (Topic 5). Essential crystallography of lattices and structures; symmetry; elements of diffraction and reciprocal lattices; point, line,

and surface defects in crystals; crystalline interfaces; noncrystalline materials; polymers; glasses. Mechanical Engineering 386P (Topic 5) and Materials Science and Engineering 386P (Topic 5) may not both be counted.

MSE 389. Topics in Materials Science and Engineering.

Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing and consent of instructor; additional prerequisites may vary with the topic.

MSE 397. Graduate Seminar.

Presentation of research topics by invited speakers, faculty, and students. Three lecture hours a week for one semester. Offered on the credit/no credit basis only. Prerequisite: Graduate standing.

MSE 197R, 297R, 397R. Research.

Individual research. May be repeated for credit. Offered on the credit/no credit basis only. Prerequisite: Graduate standing.

MSE 698. Thesis.

The equivalent of three lecture hours a week for two semesters. Offered on the credit/no credit basis only. Prerequisite: For 698A, graduate standing in materials science and engineering and consent of the graduate adviser; for 698B, Materials Science and Engineering 698A.

MSE 398R. Master's Report.

Preparation of a report to fulfill the requirement for the master's degree under the report option. The equivalent of three lecture hours a week for one semester. Offered on the credit/no credit basis only. Prerequisite: Graduate standing in materials science and engineering and consent of the graduate adviser.

MSE 399W, 699W, 999W. Dissertation.

Research leading to the Doctor of Philosophy in materials science and engineering. May be repeated for credit. Offered on the credit/no credit basis only. Prerequisite: Admission to candidacy for the doctoral degree.

Professional Courses