

MTSI - Materials Science

MTSI 500 Survey of Mat Science: 1 Credits (1 Other)

Topics offered at the graduate level which are not covered in regular courses focusing on relevant specialty areas of materials science and engineering research. Students will participate in preparing and presenting discussion material.

MTSI 501 Material Structure and Bonding: 3 Credits (3 Lec)

PREREQUISITES: Admission into the Materials Science Ph.D. program or Master's/Ph.D. programs in Chemistry, Mechanical Engineering, Chemical Engineering, Physics or other related discipline. Graduate students in their 2nd year or beyond need to be in good standing or have consent of the instructor

Ionic and covalent bonding; quantum mechanical foundation of the cohesion of solids, evolution of band structure; static and dynamic underpinning of macroscopic materials properties including mechanical, electrical and thermal; effect of defects on material properties.

MTSI 502 Adv Materials Science II: 3 Credits (3 Lec)

Fundamental principles of how materials are designed and synthesized to achieve specific performance. The team taught course is broken up into three 12-lecture segments. Each segment will cover a specific topic including ceramics, polymers, magnetic materials, biomaterials, glasses, etc.

MTSI 503 Optical, Electronic, and Magnetic Properties of Materials: 3 Credits (3 Lec)

PREREQUISITE: MTSI or consent of instructor. Materials Science 503 (MTSI 503) is an introductory graduate level class that examines the origin of material optical, electronic, and material properties. With a focus on fundamental underpinnings, the course will investigate the principles responsible for optical transmission, reflection, absorption and emission; conducting, semi-conducting, and insulating behaviors; and the origins of material magnetic properties

MTSI 511 Thermodynamics of Materials: 3 Credits (3 Lec)

Advanced thermodynamic principles are presented in the context of materials science and processing. The course focuses on the application of thermodynamic principles to materials structure, properties and processing. Subject matter includes elements of solution thermodynamics and application to equilibrium diagrams.

MTSI 512 Kinetics Phase Transformations: 3 Credits (3 Lec)

Treatment of mechanisms controlling the rates of structural/chemical changes in materials. Quantitative diffusion theory and the behavior of surfaces and interfaces. Nucleation and growth as a mechanism for phase transformations and application of phase transformations in materials manipulation and processing.

MTSI 551 Adv Materials Characterization: 3 Credits (3 Lec)

PREREQUISITES: Admission to the Materials Science or related Master's or Ph.D. program for first year graduate students; graduate students in their 2nd year or beyond need to be in good standing or have consent of the instructor

Theory and practice of experimental materials characterization examining X-ray Diffraction, X-ray Photoelectron Spectroscopy (XPS), atomic force microscopy (AFM), Raman spectroscopy and nano-Auger spectroscopy.

MTSI 552 Adv Material Character II: 3 Credits (3 Lec)

Theory and practices of experimental materials characterization examining Optical/Electron Microscopy, Bulk and Surface Analysis, mass Spectroscopy and Chromatography.

MTSI 594 Seminar: 1 Credits (1 Lec)

1 Lec; 1 cr max) F,S.