Materials Research and Technology Institute Courses

Courses

Instrumentation and Modeling Short Courses (0-1) Each short course will provide detailed instruction and hands on experience in the use of one instrument (TEM or SEM/EDS, or XPJ/LEEDS/Auger, etc.) or a cluster of related instruments (DTA and DSC and DMA, for example) or an advanced software package for modeling or simulation of materials.
Department: Materials Science & Engr.
1 Credit Hour
1 Total Contact Hour
1 Lab Hour
0 Lecture Hour
0 Other Hour

MASE 6191. Individual Studies.
Individual Studies (0-0-1) Independent studies in materials science and engineering.
Department: Materials Science & Engr.
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
1 Lecture Hour
0 Other Hour

MASE 6194. Graduate Research Projects.
Graduate Research Projects (0-0-1)
Department: Materials Science & Engr.
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour

MASE 6195. Doct. Rsrch Symposium I.
Doctoral Research Symposium I (0-0-1) MASE 6195 involves formal presentations and discussion by research students in the program (first year).
MASE 6196 is taken in subsequent semesters or years where students make presentations and occasionally outside speakers make presentations on related topics to materials science and engineering. Prerequisites: MASE 6195 first and then MASE 6196 at least twice.
Department: Materials Science & Engr.
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour

MASE 6196. Doct. Rsrch Symposium II.
Doctoral Research Symposium II (0-0-1) MASE 6195 involves formal presentations and discussion by research students in the program (first year).
MASE 6196 taken in subsequent semesters or years where students make presentations and occasionally outside speakers make presentations on related topics to materials science and engineering. Prerequisites: MASE 6195 first, then MASE 6196 at least twice.
Department: Materials Science & Engr.
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour
MASE 6291. Individual Studies.
Individual Studies (0-0-2) Independent studies in materials science and engineering.
Department: Materials Science & Engr.
2 Credit Hours
2 Total Contact Hours
0 Lab Hours
0 Lecture Hours
2 Other Hours

MASE 6294. Graduate Research Projects.
Graduate Research Projects (0-0-2)
Department: Materials Science & Engr.
2 Credit Hours
4 Total Contact Hours
0 Lab Hours
2 Lecture Hours
2 Other Hours

The course provides an overview of important and novel processing methods used for the manufacture of advanced structural and functional semi-finished components, including the metals, polymers, ceramics, and their composites.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MASE 6304 w/C or better AND MASE 6400 w/C or better)

MASE 6306. Phase Transformations and Mic.
Phase Transformation and Microstructures: The theory of the nucleation and growth kinetics of solid materials, solid-solid transformations and mechanisms. Rate processes, decomposition and ordering reactions and microstructures. Diffusionless transformations, eutectoid, a martensitic transformations are covered along with associated microstructural morphologies and property/ performance control by microstructure control in materials.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Major Restrictions:
Restricted to majors of MASE
Classification Restrictions:
Restricted to class of DR

MASE 6340. Advanced Failure Analysis.
Advanced Failure Analysis: An advanced study of structural failure processes to include topics in fracture mechanics, fatigue, and environmental assisted cracking. Analysis of failures using metallographic, electron microscopy, and microanalytic techniques will be covered. Fracture of specific materials: steels, nonferrous alloys, composites, and nonmetals will be included.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Major Restrictions:
Restricted to majors of MASE
Classification Restrictions:
Restricted to class of DR
MASE 6343. Advanced Materials/Composites.
Advanced Materials/Composites: Properties and structures of composite materials and design of composite systems to yield desired combinations of properties. Metal, ceramic, and polymer composite systems as well as high-performance alloy systems or microcomposites. Applications of materials and composite fundamentals to manufacturing and processing.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Major Restrictions:
Restricted to majors of MASE
Classification Restrictions:
Restricted to class of DR

MASE 6344. Interfacial Phenomena.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Major Restrictions:
Restricted to majors of MASE
Classification Restrictions:
Restricted to class of DR

MASE 6390. Contem Topics-Materials Sci/En.
Contemporary Topics in Materials Science and Engineering (3-0) Selected topics from materials science and engineering. Course may be repeated twice for credit as topic varies.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

MASE 6391. Individual Studies.
Individual Studies (0-0-3) Independent studies in material science and engineering.
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours

MASE 6394. Graduate Research Projects.
Graduate Research Projects (0-0-3)
Department: Materials Science & Engr.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours
MASE 6398. Dissertation.
Dissertation (0-0-3) 
Department: Materials Science & Engr.
3 Credit Hours 
3 Total Contact Hours 
0 Lab Hours 
0 Lecture Hours 
3 Other Hours

MASE 6399. Dissertation.
Dissertation (0-0-3) Prerequisite: MASE 6398.
Department: Materials Science & Engr.
3 Credit Hours 
3 Total Contact Hours 
0 Lab Hours 
0 Lecture Hours 
3 Other Hours
Prerequisite(s): (MASE 6398 w/P or better)

Advanced Concepts in Materials Science and Engineering (4-0) A blend of topics on contemporary solid state physics and chemistry emphasizing structure and properties including processing (synthesis) and performance, and illustrated by various classes of materials: structural, electronic, magnetic, photonic and superconducting. Fundamental issues and applications will include: crystal structure and phase equilibria, phase diagrams, phase transformation; reaction rate, kinetics, thermodynamics; microstructures in processing and performance; materials design/materials by design.
Department: Materials Science & Engr.
4 Credit Hours 
4 Total Contact Hours 
0 Lab Hours 
4 Lecture Hours 
0 Other Hours

MASE 6401. Mat. Applications and Eng..
Materials Applications and Engineering (3-1) A series of investigations in the application of scientific and engineering principles to practical materials systems. The course emphasizes the complexity of successful materials applications, and the interplay between processing and performance. Three to four investigations will be performed during the semester. Each investigation begins with introductory reading, discussion, and planning (including application of qualitative and quantitative experimental design concepts). Then the class performs process experiments, followed by characterization of product microstructure and performance. Students will be evaluated on the basis of their team contributions (to discussions, design of investigations, performance of the investigations, and communication of the results) as well as their individual knowledge and understanding of fundamental principles and techniques (as proven on tests).
Department: Materials Science & Engr.
4 Credit Hours 
4 Total Contact Hours 
1 Lab Hours 
3 Lecture Hours 
0 Other Hours

MASE 6402. Microchem/Microstruc Char Matl.
Microchemical and Microstructural Characterization of Materials (3-3) The structure and composition of materials can be investigated at a variety of levels utilizing a variety of analytical techniques. It is imperative that the principles and applications of a range of these techniques be presented to students examining classes of materials. Techniques which can allow microscopic and macroscopic characterization should be presented as well as techniques for bulk, surface, and related interfacial characterization. This course will focus on a variety of microscopy and spectrometry techniques: optical, electron, acoustic, and ion. As many microanalysis areas as possible will be demonstrated by having students visit facilities on the campus which constitute a materials characterization and analysis network. Principal microanalysis areas will include: x-ray diffraction, electron microscopy (scanning and transmission), electron probes, surface and near surface microanalysis, and optical and acoustic microscopy.
Department: Materials Science & Engr.
4 Credit Hours 
6 Total Contact Hours 
3 Lab Hours 
3 Lecture Hours 
0 Other Hours