Materials Research and Technology Institute Courses

Courses

MASE 5340. Advanced Failure Analysis.
Advanced Failure Analysis (3-0) 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 nonmetallics will be included.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

MASE 5343. Advanced Materials/Composites.
Advanced Materials and Composites (3-0) 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. Offered in alternate years.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MME 5401 w/C or better ) AND (MME 3503 w/C or better)

MASE 5344. Interfacial Phenomena-Mat Syst.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MME 5401 w/C or better ) AND (MME 3503 w/C or better ) AND (MME 5304 w/C or better ) AND (MME 5305 w/C or better)

Special Topics in the Chemistry of Materials (3-0) Synthesis of polymers and advanced materials by condensation, addition and other types of polymerization. Solution methods of characterization. Solid state properties and their structural basis. May be repeated for credit when topic varies.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

MASE 5392. Spec. Topics in Materials Eng..
Special Topics in Materials Engineering (3-0) Selected topics in materials engineering including advanced materials and processes, structure and properties of advanced materials, advanced materials performance, etc. May be repeated for credit when topic varies.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
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.

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.

1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour

MASE 6193. Doctoral Clinical Research.
The PhD. student is matched with a research clinician and will "shadow" the clinician throughout the course. The following activities are conducted: direct observation of procedures (diagnostic and interventional), development of Institutional Review Board protocols, clinical data analysis, and interaction with the company sponsoring a device/drug trial.

1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour

Prerequisite(s): (BIOL 6305 w/C or better) AND (DRSC 5495 w/C or better) AND (MASE 6321 w/C or better)

MASE 6194. Graduate Research Projects.
Graduate Research Projects (0-0-1).

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.

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.

1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour
MASE 6197. Medical Device Practicum.
The use of structured techniques for client needs identification will be taught. Student teams will follow a structured process for the concept generation design of a biomedical device. Students will consult experts, perform patent searches, and conduct competitive benchmarking as part of external searches for solutions.
1 Credit Hour
3 Total Contact Hour
0 Lab Hour
0 Lecture Hour
3 Other Hour

Prerequisite(s): (MASE 6192 w/C or better AND MASE 6327 w/C or better)

MASE 6291. Individual Studies.
Individual Studies (0-0-2) Independent studies in materials science and engineering.
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).
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.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

Prerequisite(s): (MME 5304 w/B or better)

MASE 6321. BME for Global Health.
Graduate level course that provides an overview of the role of engineering technological advances to improve human health. The following points will be emphasized throughout the semester: What are the challenges in healthcare delivery in remote locations; How are we paying for healthcare delivery; What is the role of engineering to solve healthcare problems; and how do new healthcare technologies move from the lab to the beside.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

MASE 6325. Telemedicine & Imaging Informa.
This course focuses on applications of point-of-care diagnostics for chronic disease management. It also introduces basic concepts in telemedicine. Students will gain the knowledge, understanding and practical preparation needed to implement a program to diagnose and treat patients in remote areas.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
MASE 6326. BME Dev Design & Regulation.
This course introduces the regulatory requirements for the design, testing, and clinical implementation of medical devices and biologics. The first part covers the FDA regulatory process. The second part covers key legal and policy issues involved in a clinical organization: Health Insurance Portability and Accountability Act and Joint Commission on the Accreditation of Health Care Organizations rules on risk management, standards, regulations, compliance and ethics.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

Prerequisite(s): (MASE 6325 w/C or better) OR (EE 6325 w/C or better) OR (EE 5325 w/C or better) OR (MME 5325 w/C or better)

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.
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.
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).
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours

MASE 6398. Dissertation.
Dissertation (0-0-3).
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours

MASE 6399. Dissertation.
Dissertation (0-0-3).
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.
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).
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.
4 Credit Hours
6 Total Contact Hours
3 Lab Hours
3 Lecture Hours
0 Other Hours