

# MATERIALS ENGINEERING (MTEN)

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## **MTEN 2606 Engineering Materials 3 s.h.**

Properties and uses of engineering materials, manufacturing processes, including heat treatments and forming operations. Introduction to mechanical testing methods. Listed also as MECH 2606.

**Prereq.:** MATH 1572.

## **MTEN 3721 Engineering Plastics 3 s.h.**

Preparation, characterization, manufacture, properties and applications of commercial polymers.

**Prereq.:** CHEM 1516, CHEM 1516L, CHEN 2683, and MTEN 3721L or concurrent.

## **MTEN 3745 Corrosion of Engineering Materials 3 s.h.**

General principles and forms of corrosion and degradation, preventative measures and designs which avoid corrosion and environmental degradation, failure analysis.

**Prereq.:** CHEM 1516, CHEM 1516L.

## **MTEN 3752 Ceramic Materials 3 s.h.**

Composition, microstructure, processing, and properties of commonly used ceramics and glasses. Advanced ceramics including piezoelectric ceramics, optical fibers, microelectromechanical systems (MEMS), and carbon polymorphs such as fullerenes and carbon nanotubes.

**Prereq.:** MECH 2606 or MTEN 2606.

## **MTEN 3753 Materials used in Electrical Devices 3 s.h.**

Properties and processing of materials used in modern electronic devices. Manufacturing techniques used to make common electronic devices such as p-n rectifying junctions, MOSFET transistors, integrated circuits, magnetic storage devices, LEDs, and lasers.

**Prereq.:** MECH 2606 or MTEN 2606.

## **MTEN 3768 Engineering Forensics using the SEM 3 s.h.**

Use of Scanning Electron Microscope (SEM) for forensic and failure analysis investigations. Individual term projects using the stereomicroscope, preparing SEM samples, taking SEM photomicrographs, and using the energy dispersive x-ray analyzer. Two hours lecture and three hours lab per week.

**Prereq.:** MECH 2606 or MTEN 2606.

## **MTEN 3783 Properties, Processing, and Applications of Metals 3 s.h.**

Composition, processing, heat treatment, microstructure, and properties of commonly used engineering alloys. Alloy and heat treatment selection for the optimization of desired properties for engineering applications. Two hours lecture, three hours lab per week.

**Prereq.:** MECH 2606 or MTEN 2606.

## **MTEN 4815 Introduction to Biomaterials 3 s.h.**

The uses of synthetic materials including metals and alloys, ceramics, pyrolytic carbon and polymers within a human body. Reaction of human body to devices made out of the synthetic materials. Impact of human environment on the materials. Use of biomaterials in orthopedic, drug delivery, skin grafts, etc.

**Prereq.:** MTEN 3721.

## **MTEN 4820 Fiber-reinforced Composite Materials 3 s.h.**

Introduction to the manufacture and applications of fiber-reinforced composite materials. Topics covered include polymer, ceramic and metallic matrix composite materials. Principles in selection and processing of composite materials are considered.

**Prereq.:** MTEN 3721.

## **MTEN 4825 Foamed Materials 3 s.h.**

Properties, processing, and applications of foamed materials with an emphasis on metallic foams.

**Prereq.:** MTEN 3783 or permission of instructor.

## **MTEN 4888 Materials Engineering Design 3 s.h.**

Development of materials engineering designs from the proposal phase to the detailed engineering phase. The application of materials engineering and cost principles to the design of processes and products including societal, aesthetic, environmental and safety considerations.

**Prereq.:** ISEN 3724 and senior standing.

## **MTEN 5868 Failure Analysis Using the SEM 3 s.h.**

Advanced methods in failure analysis of products and structures. Failure modes and mechanisms. Characteristics of fracture surfaces. Failure analysis investigations using the stereomicroscope and the Scanning Electron Microscope (SEM). Two hours lecture, three hours lab per week.

**Prereq.:** 96 s.h. of degree credit and permission of instructor.