MOHAWK VALLEY COMMUNITY COLLEGE UTICA AND ROME, NEW YORK

COURSE OUTLINE

MATERIALS SCIENCE MT 209

Catalog Description

MT209 Materials Science C 2, P 2, CR 3

This course covers the composition, structure, processing, and performance of engineering materials as well as their physical and chemical properties. Topics include the chemistry of metals, plastics, and ceramics, atomic bonding, metal/ceramic/polymer structures, imperfections, diffusion, mechanical behavior

/properties, deformation mechanisms, strengthening mechanisms, mechanical failure, phase diagrams, phase transformations, and material types & applications. Laboratory exercises include modeling crystal structures, diffusion, tensile & torsional Strength, hardness, heat treatment, and tours to local

materials-related industries.

Prerequisites: MA121 Fundamentals of College Mathematics; and CH131 College Chemistry or CH141 General Chemistry I; and MT230 Strength of Materials: Mechanical or ES261 Mechanics of Materials.

Student Learning Outcomes

*After this course, the successful student will be able to...*

1. …demonstrate their understanding of the basic properties of materials such as ferrous, nonferrous metals and their alloys, plastics, and ceramics and how these properties are developed through the “composition > processing > structure > properties > performance” model (e)
2. …determine classification of materials through using different mechanical testing methods performed in the laboratory.
3. …demonstrate their ability to perform heat-treating methods and analyze the results of these processes.
4. …determine the selection of materials that will perform satisfactorily in a given set of environmental conditions.
5. …solve problems relating to chemical composition and phase diagrams of different alloy systems such as copper/zinc and iron/carbon. (f)
6. …demonstrate their ability to provide written reports on laboratory experiments in material science. (g)
7. …demonstrate their ability to work in groups and practice safe operational procedures. (a) () – References ETAC of ABET Program Outcome

Major Course Topics

Atomic Bonding

Metal, Ceramic, and Polymer Structures

Imperfections Diffusion

Mechanical Behavior / Properties

Deformation Mechanisms Strengthening Mechanisms Mechanical Failure

Phase Diagrams

Phase Transformations

Material Types & Applications Special Topics

Laboratory Exercises

Crystal structures Diffusion

Tensile & Torsional Strength, Hardness Heat treatment

Tours of Local Materials-Oriented Industries