Bemidji State University

TADT 3217: Materials Science and Metallurgy

A. COURSE DESCRIPTION

   Credits: 3
   Lecture Hours/Week: *.*
   Lab Hours/Week: *.*
   OJT Hours/Week: *.*
   Prerequisites: None
   Corequisites: None
   MnTC Goals: None

   This course focuses on the properties of materials and is intended as an introduction to materials science. Materials are used in everything and many major engineering problems are materials problems. This course will provide students with the skills and knowledge necessary to solve many of these problems. This is primarily a lab based course that focuses on mechanical testing and structural analysis of polymers, metals, and ceramics. Prerequisites: TADT 2217, TADT 2877, MATH 1470, and junior status.

B. COURSE EFFECTIVE DATES: 08/22/2016 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

   1. Atomic Structure & Bonding
   2. Calorimetry Methods
   3. Characteristics, Applications, & Processing of Polymers
   4. Corrosion & Degradation of Materials
   5. Diffusion in Solids
   6. Dislocations & Strengthening Mechanisms in Crystals
   7. Electrical Properties of Materials
   8. Impact Testing of Materials
   9. Imperfections in Solids
   10. Material Failure Mechanisms
   11. Mechanical Properties of Metals
   12. Mechanical Property Testing Methods
   13. Metal Alloys
   14. Metallographic methods
   15. Phase Diagrams of Crystalline Materials
   16. Phase Transformations in Metals
   17. Polymer Structures
   18. Structures and Properties of Ceramics & Glasses
   19. Structures of Composites & Wood
   20. Surface Profilometry
   21. The Structure of Crystalline Solids
   22. Thermal Properties of Materials
D. LEARNING OUTCOMES (General)

1. broaden their understanding of technology through interdisciplinary connections.
2. develop creative, design, and technological skills.
3. assist individuals in exploring, assessing, and preparing for careers relating to technology.
4. develop their understanding of the impacts of technology.
5. demonstrate and apply knowledge of advanced materials and processes.
6. be able to make informed decisions about the use of materials in various applications.
7. understand the behavior of materials in various applications and environments.
8. understand the reason for and application of various materials testing techniques.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted