

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