

## **ENGR 2070: Materials and Processes**

This course is required for all engineering majors.

Course Coordinator:

William E. Howard

Catalog Description:

Study of the materials used in engineering and related manufacturing processes. Materials topics include the atomic structure of materials, alloys, phase diagrams, and heat treatment. Manufacturing processes include casting, forming, machining, and joining processes.

Course Structure:

Three 50-minute lectures per week (three credits)

Prerequisites:

None

Required Materials:

Materials and Processes in Manufacturing, Ninth Edition, DeGarmo, Black, and Kohser, Wiley, 2003.  
ISBN 0-471-65653-4

Course Outcomes:

Upon completion of this course, students shall be able to:

- Describe the characteristics of crystalline and non crystalline materials
- Describe general behavior of metals, ceramics and plastics
- Specify and interpret results of basic materials tests
- Identify strengths and limitations of basic manufacturing processes
- Recommend appropriate manufacturing processes based on material, desired attributes and cost

Lecture Topics:

- Properties of materials (2 classes)
- Nature of Materials and Alloys (3 classes)
- Phase diagrams (4 classes)
- Heat treatment (2 classes)
- Ferrous metals and alloys (3 classes)
- Nonferrous metals and alloys (3 classes)
- Other materials (2 classes)
- Material selection (2 classes)
- Casting processes (3 classes)
- Forming Processes ( 3 classes)
- Machining Processes (6 classes)
- Joining processes (3 classes)
- In-class laboratory demonstrations:
- Tensile testing (2 classes)
- Hardness testing (2 classes)
- Exams (2 classes)

Relevant Program Outcomes:

Graduates of the Engineering program will demonstrate

- a) an ability to apply knowledge of mathematics, science, and engineering.
- b) an ability to design and conduct experiments, as well as to analyze and interpret data.
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

Professional Component Content:

Math/Science: 1 credit; Engineering: 2 credits; General Education: 0

Assessment Requirements:

Student Work Samples

- Report on manufacturing aspects of a product (Outcome c)

Targeted Exam Questions

- Application of materials science (Outcome a)

Student Course Survey

Last Review:

December 18, 2007 by William E. Howard