ME 47300
ENGINEERING DESIGN USING MODERN MATERIALS

Course Outcomes [Related ME Program Outcomes in brackets]

1. To teach micro and macro properties of metals, ceramics, polymers and composites. [A1, B1]
2. To teach design methodology with these materials. [A1, B1]
3. To introduce interdisciplinary aspects of design with modern materials. [A1, B1]
4. To work in interdisciplinary teams. [B2]

Design Methods (4 wks)
1. Basic mechanics of materials
2. Failure criteria
3. Fracture mechanics and fatigue
4. Structural analysis

Metals and Ceramics (4 wks)
1. Properties of metals
2. Design with metals
3. Properties of ceramics
4. Design with ceramics

Polymers (4 wks)
1. Structures and properties of materials
2. Bonding and structure in polymers
3. Chemistry and microstructure
4. Mechanical properties
5. Manufacturing processes
6. Design with polymers

Composites (3 wks)
1. Fibers, matrices and composites

Revision Date: June 12, 2013
1. COURSE NUMBER AND NAME: ME 47300 Engineering Design Using Modern Materials

2. CREDITS AND CONTACT HOURS: 3 credits
   a. Lecture – 3 days per week at 50 minutes for 16 weeks

3. COURSE COORDINATOR OR INSTRUCTOR:
   K. Kokini (ME) and J.M. Caruthers (ChE)

4. TEXTBOOK:
   None

5. SPECIFIC COURSE INFORMATION:
   a. Course Description: Interdisciplinary approach to design with modern materials such as metals, ceramics, polymers, and composites. Topics include: fundamentals of basic mechanics of materials, failure theories, and fracture mechanics applied to different materials; basic material properties and design with metals and ceramics; microstructure, chemistry, and bonding in polymers; materials properties and design with polymers; introduction to composite materials. Typically offered in the spring.

   b. Prerequisites:
      Senior Standing

   c. Status:
      Elective

6. SPECIFIC GOALS FOR THE COURSE
   a. Course Outcomes:
      [Related ME Program Outcomes in Brackets]
      1. To teach properties of metals, ceramics, polymers and composites. [A1, B1]
      2. To teach design methodology with these materials. [A1, B1]
      3. To introduce interdisciplinary aspects of design with modern materials. [A1, B1]
      4. To work in interdisciplinary teams. [B2]

   b. Related ME Program Outcomes:
      [Related ABET Outcomes Listed in Brackets]
      A1. Engineering Fundamentals; B3. Prof/Ethical Responsibility;
      A3. Experimental Skills; B5. Life-Long Learning;
      A4. Modern Engr Tools; C1. Leadership,
      A5. Design Skills; C2. Global Engineering Skills;
      A6. Impact of Engr Solns; C3. Innovation;
      B1. Communication Skills; C4. Entrepreneurship
      B2. Teamwork Skills

7. LIST OF TOPICS: See following page.

PREPARED BY: K. Kokini (ME) and J.M. Caruthers (ChE)  
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