Instructor: Ashok Saxena, 315 John A. White Engineering Hall, asaxena@uark.edu, 479-575-2780, 479-466-4301 (Cell, text messages welcome)

Pre-requisite: Graduate standing in Mechanical, Civil, Aerospace, Biomedical Engineering

Text Book: Ashok Saxena, Open Electronic Resource, Copyright 2017, electronic copy provided free of cost to registered students

Course Description and Objectives: The field of fracture involves understanding why load-bearing elements in mechanical systems sometimes fail catastrophically and how that risk can be minimized by:

- proper selection of materials,
- good design practices that reduce stress concentrations
- specifying appropriate maintenance and inspection criteria and intervals and,
- making timely run/repair/retire decisions that ensure safe operation of the fracture critical parts.

The approach to predicting and understanding fracture in a wide variety of materials that are used in load-bearing, structural applications must, by their very nature, be multidisciplinary. The fracture mechanics concepts have been applied in various fields of engineering such as mechanical, biomedical, electrical, civil, and aerospace engineering.

The primary learning objectives of the course are to understand the basic concepts of linear-elastic fracture mechanics (LEFM), nonlinear fracture mechanics and fatigue of materials for predicting fracture in metallic, ceramic, polymeric parts, and in bones and soft tissues. The course will include (a) discussion of the mechanics under-pinning of the fracture mechanics concepts (b) a discussion of the experimental test methods for determining material properties that are an integral part of the fracture mechanics analyses and (c) applications of fracture mechanics to real components.

Grading Policy: Term grades will be based on homework assignments (10%), two midterm examinations (20% each) and a final comprehensive examination (50%). All examinations will be closed book but you will be provided with a sheet of formulas that cover the various topics in the class. I can be reached by e-mail and would be happy to assist with any portion of the lecture material and to also provide you guidance on homework.

Reference Books:

4. Biomechanics
5. Various other references and internet resources to be provided in the Handouts