AE/CEE/CHBE/ME/MSE7772 – Fundamentals of Fracture Mechanics

Prerequisites: Mechanics of Materials

Textbook:
Fracture Mechanics - Fundamentals and Applications by T. L. Anderson, 3rd Edition

References:
A Course on Nonlinear Fracture Mechanics by J. W. Hutchinson
(http://www.seas.harvard.edu/hutchinson/papers/353-5.pdf)
Advanced Fracture Mechanics by M. F. Kanninen and C. H. Popelar

Instructor: Prof. Shuman Xia
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Office Hours: Wednesday: 4:30pm-6:30pm

Homework: Will be posted on T-square.

Exam Schedule:
Final Exam: Friday, December 9 (2:50pm-5:50pm)

Percentage for Grade Calculation:
Homework: 30% of Final Grade
Project: 30% of Final Grade
Final Exam: 40% of Final Grade

Course Outcomes: The primary learning objective of the course is to thoroughly understand the basic concepts of linear-elastic fracture mechanics (LEFM) and elastic-plastic fracture mechanics (EPFM) for predicting fracture and crack growth in structural components that contain cracks or crack-like defects. The course will emphasize the fundamental underpinnings of fracture mechanics and its use in material evaluation and life prediction for components. Micro-mechanisms of crack growth for metals and ceramics will also be covered.

Course Outline:

Intro / Overview	Ch. 1
Fundamentals of LEFM	Ch. 2
Basic Concepts of EPFM	Ch. 3
Fracture Mechanisms in Ceramics and Metals	Ch. 5-6
Fracture Toughness Testing	Ch. 7
Fatigue and Stress Corrosion Cracking	Ch. 10-11