AE/CHBE/ME/MSE 7772 – Fundamentals of Fracture Mechanics
Fall 2024

Instructor:
Prof. Shuman Xia
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Lectures: MW 12:30 pm -1:45 pm, Love 184

Office Hours:
Monday, 2:00 pm - 3:30 pm
Office hours are both in person in MRDC 4103 and online at
https://gatech.zoom.us/j/92443768683

Prerequisites: Mechanics of Materials

Textbook:
Fracture Mechanics - Fundamentals and Applications by T. L. Anderson, 3rd or 4th 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

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 materials evaluation and life prediction for components. Micro-mechanisms of crack growth for metals and ceramics will also be covered.

Homework:
Homework will be posted on Canvas (https://canvas.gatech.edu/).

Exam Schedule:
On-campus students:
Midterm Exam: 12:30 pm - 1:45 pm, Wednesday, Oct 9
Final Exam: 11:20 am - 2:10 pm, Wednesday, Dec 11

DL students:
This course requires in-person proctoring for DL students, and GTPE handles the proctor nomination process. Please work with GTPE to nominate a proctor that meets Georgia Tech's requirements. You will have the following 3-day windows to schedule each exam with your proctor:

Midterm Exam: 75 min, Oct 9-11
Final Exam: 170 min, Dec 11-13

Percentage for Grade Calculation:
Homework: 25% of final grade
Midterm Exam: 30% of final grade
Final Exam: 45% of final grade

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