MTSC 4800 – FRACTURE MECHANICS

Spring Quarter 2002 – MW 6:30-7:50
(Crosslisted as ENME 3820)

Instructor: Dr. Peter Laz
Assistant Professor in Mechanical Engineering
Office: CMK 106
Phone: (303) 871 - 3614
Email: plaz@du.edu

Office Hours: TBA
and by appointment

Textbook (Required):

Anderson, T.L., "Fracture Mechanics – Fundamentals and Applications," 2nd Ed., CRC Press, Boca Raton, FL, 1995.

Additional References:

Barsom, J.M. (Editor) "Fracture Mechanics Retrospective – Early Classic Papers (1913-1965)," American Society for Testing and Materials, Philadelphia, 1987.

Hertzberg, R.W. "Deformation and Fracture Mechanics of Engineering Materials," 4th Ed., John Wiley and Sons, Inc., New York, 1996.

Broek, David, "Elementary Engineering Fracture Mechanics," 4th Ed., Martinus Nijhoff Publishers, 1986.

Course Description: MTSC 4800 Advanced Topics in Material Science – Fracture Mechanics. Topics include stress field at a crack tip, linear elastic fracture mechanics, energy release rate, stress intensity factors, plastic zones, plane stress, plane strain, fracture toughness, Airy stress functions, elastic-plastic fracture mechanics, J integral, crack tip opening displacements, experimental testing, fatigue, life prediction, crack closure, weight functions, failure analysis. *3 qtr. hrs.*

COURSE POLICY

Course Format: The format of the course is lecture. Examples, reading and homework assignments, and a project are used to supplement the lecture material. Interaction and questions are encouraged.

Homework: Homework assignments will be due weekly. No late homework is accepted. Homework solutions will be posted outside of my office.

Project: The project will be introduced in the third week of the quarter. The project will involve a detailed investigation of one aspect of fracture mechanics. Students will choose project subjects related to their research, work applications, or general interests. Projects may include the development of a life prediction code, determination of the stress intensity factor or J integral using FEA, failure analysis of a component, etc. Projects will be carried out individually and will result in a final report and a 10-12 minute presentation.

Grading:

25%	Mid Term Exam
30%	Final Exam*
25%	Homework
20%	Project
100%	Total

Academic Integrity: The University of Denver has recently adopted an Honor Code. You are responsible to know and obey the Honor Code. See the following link for information about the Honor Code: http://www.du.edu/honorcode

Classroom Environment:
The classroom is a place of learning. An environment that promotes learning and instruction will be maintained. Courtesy and respect of all students are expected at all times. Inappropriate and disruptive behavior will not be tolerated.

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COURSE SYLLABUS

Date	Subject	Reading Due	Homework Due
M 3/25	Introduction and Overview	Ch. 1	
W 3/27	Energy Release Rate, Stress Fields	Ch. 2	
M 4/1	LEFM - Stress Intensity Factor	Ch. 2	**HW 1 Due**
W 4/3	LEFM - Toughness, Plasticity	Ch. 2	
M 4/8	Airy Stress Function		
W 4/10	Elastic Plastic FM - J Integral	Ch. 3	
M 4/15	EPFM - J Integral – CTOD	Ch. 3	
W 4/17	EPFM - J Integral / CTOD	Ch. 3	
M 4/22	Mixed Mode Fracture		
W 4/24	**Mid Term Exam**		
M 4/29	Mixed Mode Fracture		
W 5/1	Fracture Mechanisms – Metals	Ch. 5	
M 5/6	Fracture Mechanisms - Non-Metals	Ch. 6	
W 5/8	Experimental Testing	Ch. 7	
M 5/13	Fatigue - Life Prediction	Ch. 10	
W 5/15	Fatigue - Crack Closure	Ch. 10	
M 5/20	Weight Functions		
W 5/22	Failure Analysis		
M 5/27	**No Class - Memorial Day**		
W 5/29	Student Presentations		**Project Due**
M 6/3	Review		
W 6/5	**Final Exam**		