AE 737 - Mechanics of Damage Tolerance

Spring 2016

Instructor:	Dr. Nicholas A Smith	**Time:**	TR 4:10 – 5:25 pm
Email:	Nicholas.A.Smith@wichita.edu	**Place:**	209 Wallace Hall

Office Hours: TBD, 204 Wallace Hall

Course Textbook: The text used for this class is made up of notes originally assembled by Dr. Bert L. Smith, which will be prepared by the department. You can pick up your copy of the text in the AE offices (WH 200), the printing cost for this material is $25 (cash or check only).

Other References: The notes we use in this course provide a very good base, but sometimes supplemental material is beneficial. The following texts are recommended as additional references:

- H. Broek, *The Practical Use of Fracture Mechanics*
- H.L. Ewalds and R.J.H. Wanhill, *Fracture Mechanics*
- A. F. Grandt, *Fundamentals of Structural Integrity*

Objectives: In this course we will use concepts from fracture mechanics. Students will be asked to determine residual strength and predict crack growth in structures under fatigue loading.

Prerequisites: Instructor's consent (previous experience in solid mechanics, AE333 and AE525, and differential equations, AE555, is advised).

Tentative Course Outline:

Stress Intensity
Plastic Zone
Fracture Toughness
Residual Strength
Exam 1
Fatigue Crack Growth Rate
Fatigue Crack Propagation
Exam 2
Damage Tolerance

Homework: Homework may be submitted either electronically before the class period it is due or in class on the due date. It is anticipated that one homework assignment per lecture block (as given in the course outline) will be assigned. To be graded, homework must be legible and organized in a manner that makes it easy for me to follow your work. Late homework will not be accepted, homework problems submitted out of order will not be graded.

Exams: There will be two major midterm exams during the semester. Exams will be closed-book and closed-notes, but there will be an equation sheet provided.

Final Project: More information on the final project will be provided at a later time in the course. In this final project you will be required to perform residual strength, fatigue, and damage tolerance analysis on a

real-life part of your choosing. You will use the principles developed in this class to estimate the maximum load your part can carry, a reasonable inspection cycle, etc. The part you choose should undergo cyclic loading of some form for a fatigue analysis.

Grading Policy: Homework (15%), Midterm 1 (30%), Midterm 2 (30%), Final Project (25%). Final grades follow a traditional scale of:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93-100	90-93	87-90	83-87	80-83	77-80	73-77	70-73	67-70	63-67	60-63	0-60

Per department policy, final course grades will not be disclosed before the official notifications by the University.

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. You are expected to submit your own work, but this does not exclude working and studying in groups. Group study is encouraged, but be sure that you submit your own work.