

MME 3516 Failure Analysis (Hasar Analizi)

9:30 a.m.-12:20 p.m. Room C-Z-07

Tuesdays, Spring 2016

Metallerji ve Malzeme, Mühendislik Fakültesi

Muğla Sıtkı Koçman Üniversitesi

Instructor: Prof. Dr. T. David Burleigh
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Course Objectives:

This course aims to give practical experience in the analysis of fractured and failed engineering materials and components. The course focus will be on material microstructure and the micromechanisms of fracture, and topics will include failure analysis methodology, mechanisms of failure, fracture classifications, corrosion and environmental factors, fractography, and design for failure prevention.

Reference Book:

The reference textbook is, "ASM Handbook, Vol. 11, Failure Analysis and Prevention," edited by R.J. Shipley and W.T. Becker, © 2002, ISBN: 0-87170-704-7, ASM Publications.

Failure Analysis Report and Presentation (15% of grade)

Each student will write an 8-10 page failure analysis report and make a 10-minute presentation to the class on an unexpected failure. The failures are selected by the student, approved by the professor, and have a story and a mystery to it. Plagiarized reports will receive a zero.

Team Quizzes and Exams

Attending the lectures and participating in classroom discussions are essential for a good grade. The exams and quizzes will be based on my lectures, the example problems and the case studies.

Grading:

Your semester average will be weighted with the following distribution:

Six Team Quizzes	10%
Exam #1	12%
Exam #2	13%
Report & Presentation	15%
Final Exam	50%

Tues. 2016	Lecture (Week)	Tentative Failure Analysis Lecture Topics
2-Feb	1	Introductions
9-Feb	2	Causes, Methodology, Hypotheses Art of Questioning, Team Quiz #1
16-Feb	3	Fractography: ductile versus brittle Fractography: Fatigue, Creep
23-Feb	4	Crack Branching, Origins, Advanced Fatigue, Team Quiz #2
1-Mar	5	Fractography, Overload Calculations Fracture Toughness, Pressure Vessels
8-Mar	6	Exam #1
15-Mar	7	Non Destructive Evaluation (NDE) Metallography, Team Quiz #3
22-Mar	8	Introduction to Corrosion Forms of Corrosion, Galvanic, etc.
29-Mar	9	Pitting, crevice corrosion, Design SCC, Team Quiz #4
5-Apr	10	Polymer Failures Ceramics and Glass
12-Apr	11	Exam #2
19-Apr	12	Liquid Metal Embrittlement Casting, Welding,
26-Apr	13	Metal working, Heat Treating DeHavilland Comet I, Team Quiz #5
3-May	14	Fasteners (screws bolts, rivets), presentations Legal implications, WTC collapse, presentations
10-May	15	Wear, Rolling Contact Fatigue, presentations Deepwater Horizon, Team Quiz #6
16-27 May		Final Exam