

# AE 737 - MECHANICS OF DAMAGE TOLERANCE

## LECTURE 14

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# SCHEDULE

- 10 Mar - Exam return, Final Project discussion, Project abstract assigned
- 22 Mar - Stress based fatigue, Homework 6 assigned
- 24 Mar - Stress based fatigue
- 29 Mar - Influence of notches on fatigue, Homework 7 assigned, Homework 6 due
- 31 Mar - Strain based fatigue, project abstract due

# OUTLINE

1. exam
2. final project

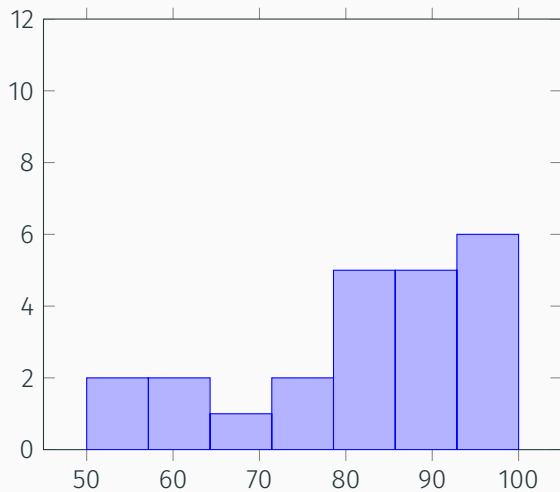
## EXAM

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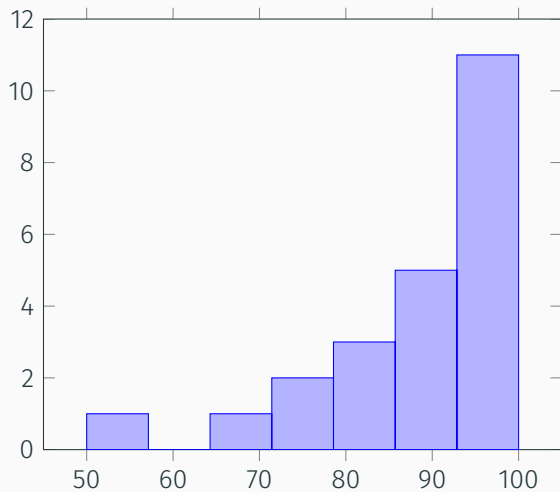
- Before curve, average score: 80.3
- Before curve, std dev: 15.8
- High score: 96 (1 student, 3 had 95)

- Purpose of curve: tighten distribution (goal is to have std dev = 10%)
- I find one exam that I consider excellent and set that as the high score (95 in this case)
- I find one that I consider "average" and set that to be a C (61 in this case)
- Curve for this exam: Adjusted score =  $0.735 (\text{original score}) + 30.15$
- New average: 89.2, new std dev: 11.6

## BEFORE CURVE



## AFTER CURVE





## FINAL PROJECT

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- This is in place of a final exam
- Should demonstrate your understanding of the course as a whole
- Choose any real object
- Needs to undergo some cyclic loading (for fatigue)
- Materials, loads, and any other "given" data can be made up

- Estimate stress intensity factor at some critical location
- Estimate residual strength (use a "typical" crack length)
- Estimate crack growth and propagation (fatigue)
- Suggest reasonable inspection cycle for safe use
- Suggest an improvement to make part more damage tolerant

## GRADE BREAKDOWN

- Per course syllabus, project will be worth 25% of final grade
- 5% Project abstract submission and approval
- 10% for each major component
  - stress intensity factor
  - residual strength
  - fatigue (x2, growth and propagation)
  - inspection cycle
- 20% for damage tolerant improvement
- 20% general presentation, organization, and grammar

## PROJECT ABSTRACT

- Main purpose of abstract is for you to make sure your idea fits with project purpose
- I will give you feedback on how to tweak your proposed idea to better meet project purpose
- Abstract submission should be 1-2 pages
- Briefly describe your chosen part, how it undergoes cyclic loading, what location you intend to consider for the stress intensity factor.
- This is like a proposal: convince me that your idea has what it takes to be a great final project

## JUSTIFY ASSUMPTIONS

- You will need to make many assumptions in order to complete this project
- Clearly state your assumptions and justify them (i.e. if you assume plane strain conditions, justify that by showing how thick your part is)
- Although will not have experimental or FE analysis specific to your part, use concepts from other data in the text (stiffeners, multiple site damage) in a qualitative manner

- Figures can greatly enhance your project report, if you use them well
- Many readers will jump to figures in a report, include sufficient information in caption and axis labels so a reader with general damage tolerance understanding can understand your figure
- This will interest them in the rest of your paper