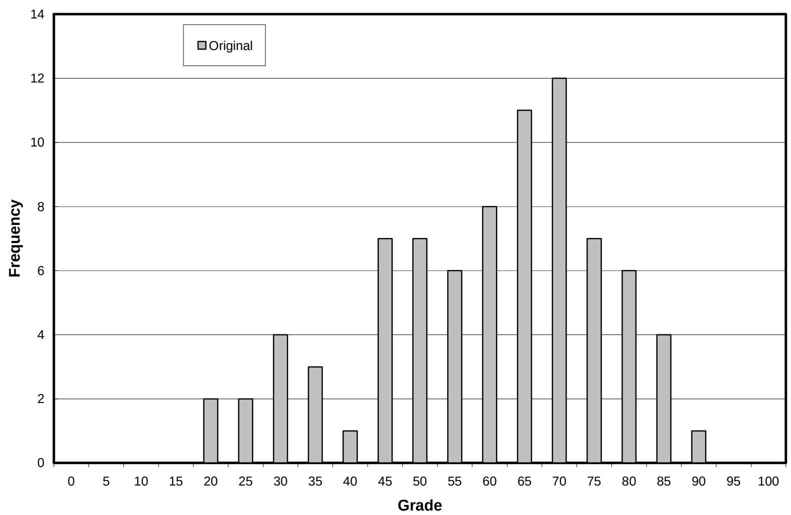
Lecture 11

Sunday, April 27, 2008
9:02 PM

Ref: 1. G. Dieter, **Mechanical Metallurgy, 3rd Edition**, *McGraw-Hill*, 1986.
2. Reed-Hill, Abbaschian, **Physical Metallurgy Principles, 3rd Edition**, *PWS Publishing Company*, 1994.

Course Notes:

- **Exams:**
  - The exams will be passed back in you lab sections
  - The answers have been posted on the website
  - For Exam 1:



Average:	62.4
Max:	91.5
Min:	24
Median:	65.5
Mode:	68.5

  - I know that this was a hard exam. I know that this was a long exam.
  - We are going to provide a 7 point shift to your scores -- that is you can add 7 points to whatever score you originally got -- and that will be your grade for this exam
  - If you have any questions -- see Peter or me

- **Course Schedule changes**
  - We were behind on lectures and then we lost last Friday, so:
  - I have rescheduled the remaining lectures
  - I'm giving you guys a homework holiday this week -- no homework due on Friday
    - > However, if you look ahead…the homework that was due this Friday was BIG
    - > I'd work ahead if I were you
  - In addition there are now only 8 homeworks assigned

Review:

- Last Wednesday we stated that there were only 3 possible material responses to an applied stress:
  - Elastic deformation
  - Plastic deformation
  - Fracture

- We then started talking about elasticity and elastic theory
- We talked about what elasticity was -- on the atomic level
- We talked about how elasticity changes with temperature
- We talked the definition of stress and the definition of strain
- We talked about Hooke's law
- We began to talk about Poisson's Ratio…

True Stress- True Strain Derivation Shown on the Board:

True Strain Derivation

$$e = \frac{\Delta L}{L_o} = \frac{L - L_o}{L_o} = \frac{L}{L_o} - 1$$

$$e + 1 = \frac{L}{L_o}$$

$$\varepsilon = \int_{L_o}^{L} \frac{dL}{L} = \ln \frac{L}{L_o}$$

$$\varepsilon = \ln(e+1)$$

True Stress Derivation

$$s = \frac{P}{A_o}$$

$$\sigma = \frac{P}{A} = \frac{P}{A_o} \frac{A_o}{A}$$

because we have constant volume

$$\frac{A_o}{A} = \frac{L}{L_o} = e + 1$$

$$\sigma = \frac{P}{A_o}(e+1)$$

$$\sigma = s(e+1)$$

Rest of Lecture is available in PowerPoint Presentation Paired with Lecture 11