ME531: Advanced Mechanics of Solids

Timings	
Monday	16:00 to 17:20
Wednesday	14:30 to 15:50

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Room No. # 106

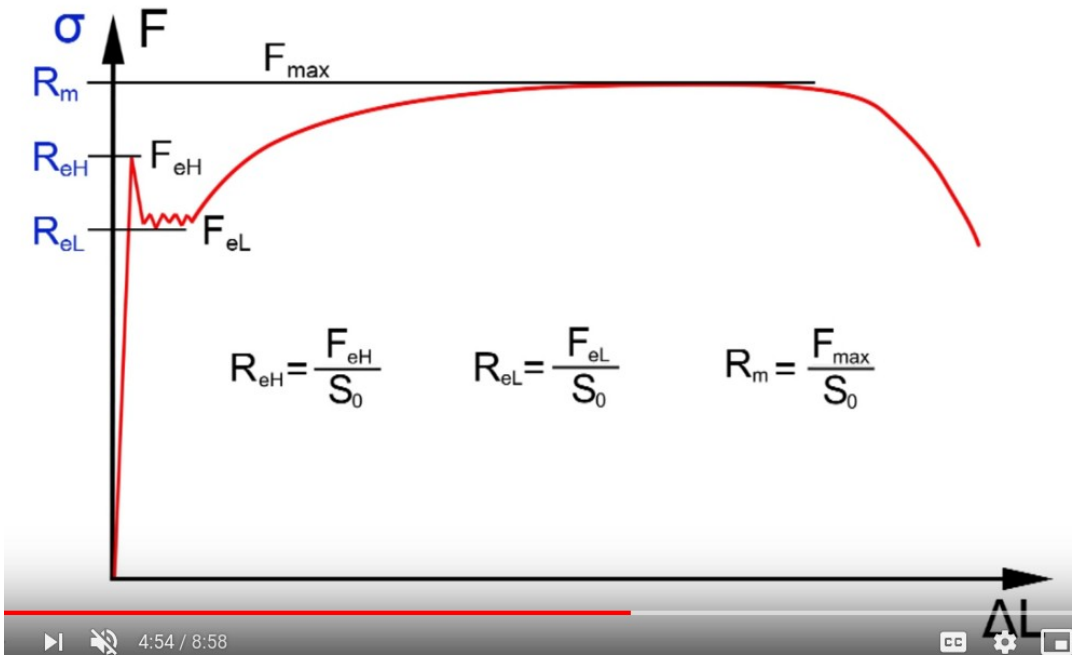
Course Plan

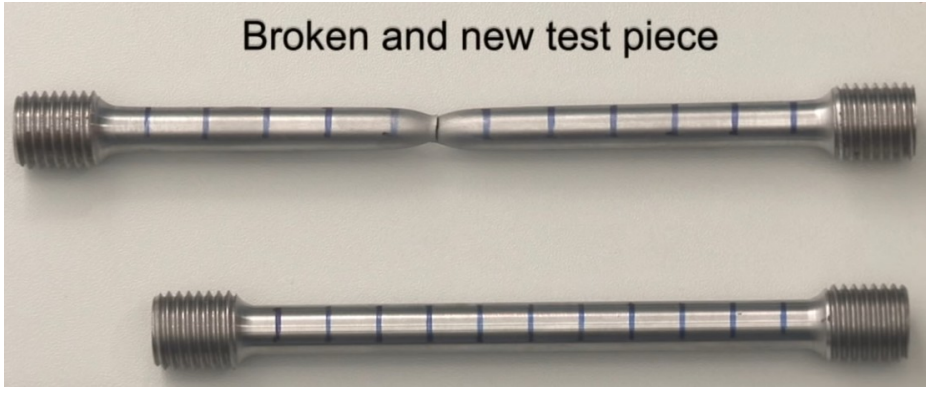
- **Tierce exam: 25% + 25% + 25% = 75%**
  - Tierce exam will be open book, limited time exams.
  - If anyone copies from another student, both the one who has copied and from whom he/she has copied will be given zero marks without seeking clarification/justification.
- **Term paper: 25%**
  - An assignment will be given to each student (by mid-semester). He/she should complete the assignment and submit by the given time. A short presentation (8-10 minute) about the same should be given before the final tierce exam. A 2-3 page report should also be submitted on the same. The report should not be directly copied from the internet or any other source and should be written in your own words. If anyone copies, zero marks will be given for the whole term paper part.

How is this course different from ME231!

Tensile test:

https://www.youtube.com/watch?v=D8U4G5kcpcM





Manufacturing operations

Forming,Deep drawing

https://www.youtube.com/watch?v=fl06XxNt0WU&feature=youtu.be&t=40

Punching, Sheet Metal Cutting

https://youtu.be/3CPygO2Z0OY

Design of ammunition

Shape charges:

https://www.youtube.com/watch?v=K-3cTsvI7ss

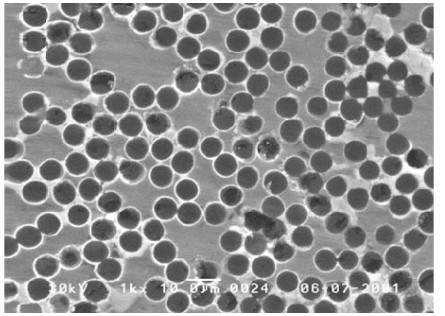
https://www.youtube.com/embed/CpVVGk2OfQQ?start=22&end=57

Bullet hitting a target:

https://www.youtube.com/embed/QfDoQwIAaXg?start=0?end=110

Modeling of Advanced materials

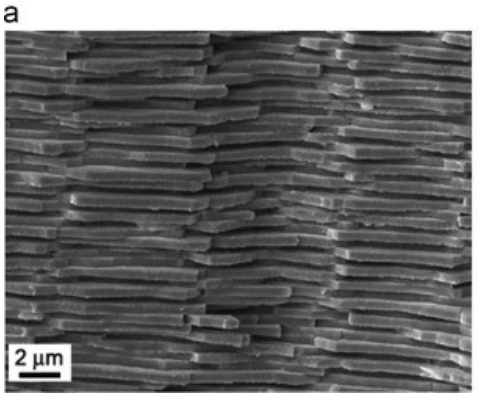
Fiber reinforced composite:

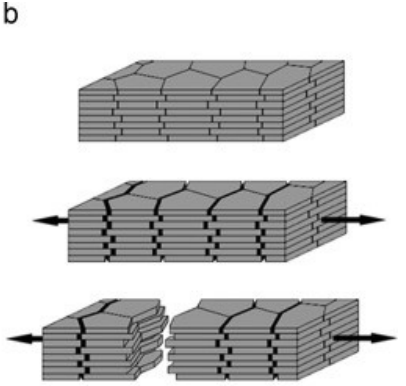


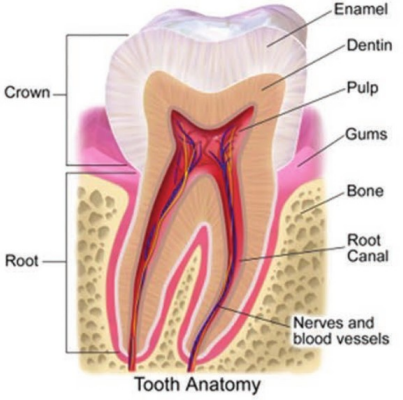
Soft materials, Polymers:

https://www.youtube.com/embed/9N5SS8f1auI

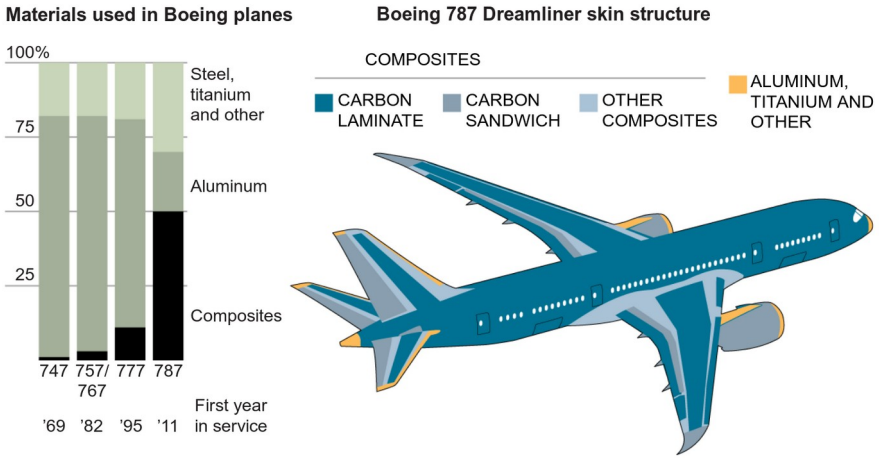
Bio-mimicking materials:

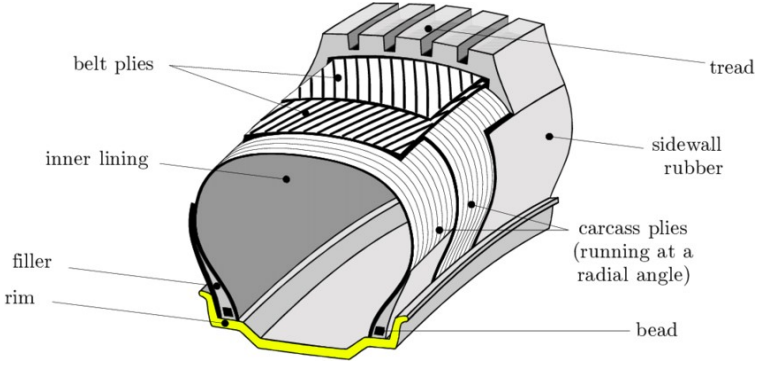






Application of Advanced materials





CFRP internal structure and body of BMW i3

Numerical simulations

https://www.youtube.com/embed/9IqRdEs4_JU?start=54&end=83

ABAQUS theory manual

https://abaqus-docs.mit.edu/2017/English/SIMACAETHERefMap/simathe-c-ov.htm

Books

- *Tensor Algebra and Tensor Analysis for Engineers* by Mikhail Itskov. Springer.
- *Continuum Mechanics* by A. J. M. Spenser. Dover Publications.
- *Introduction to Mechanics of Continuous Medium* by L. E. Malvern. Prentice-Hall Inc.
- *Applied Mechanics of Solids* by Allan F. Bower. CRC press. (http://solidmechanics.org/)
- *Continuum Mechanics for Engineers* by G. T. Mase and G. E. Mase. CRC press.