

ME531: Advanced Mechanics of Solids

Timings

Monday	11:30 to 12:50
Thursday	10:00 to 11:30

Anshul Faye
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Room No. # 106

Link: <https://iitbhilai.webex.com/meet/b103>

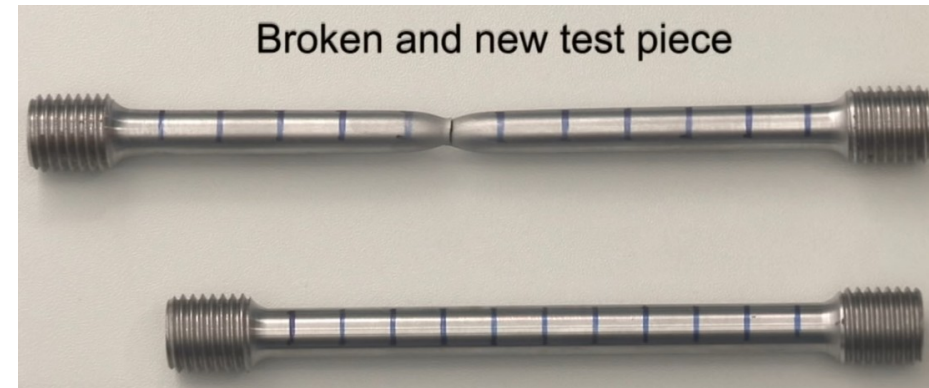
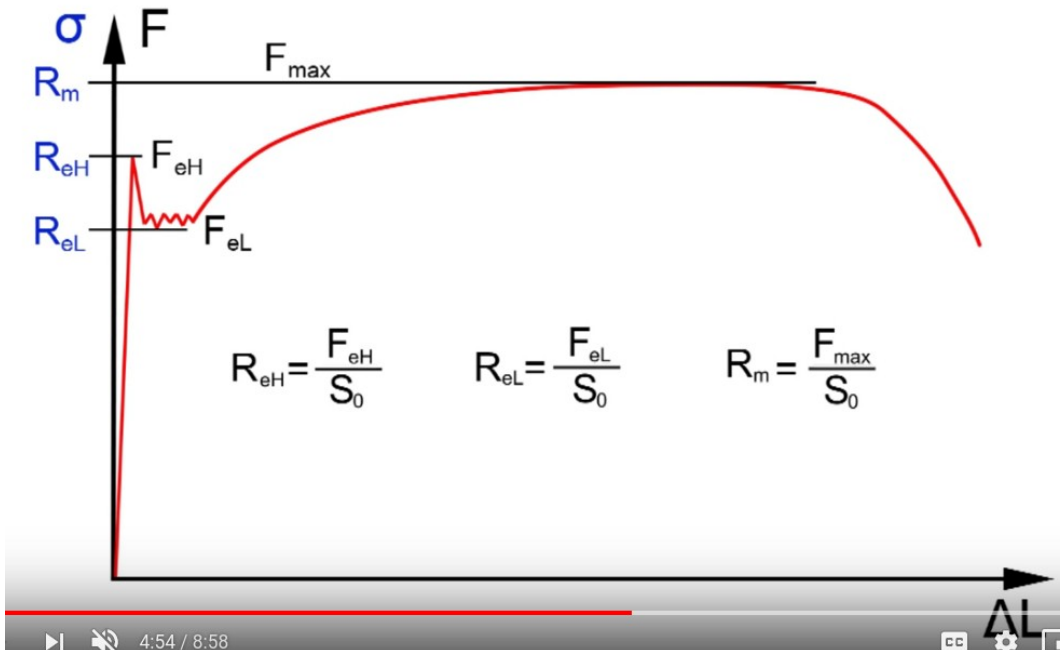
Course Plan

- **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 100% negative 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, 100% negative 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=fI06XxNt0WU&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>

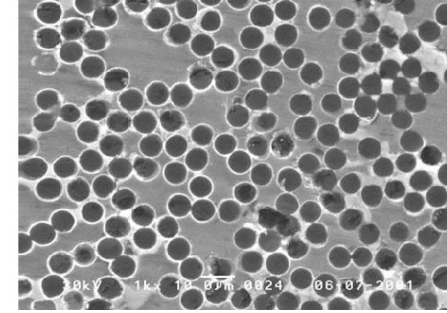
<https://www.youtube.com/embed/CpVVGk2OfQQ?start=22&end=57>

Bullet hitting a target:

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

Modeling of Advanced materials

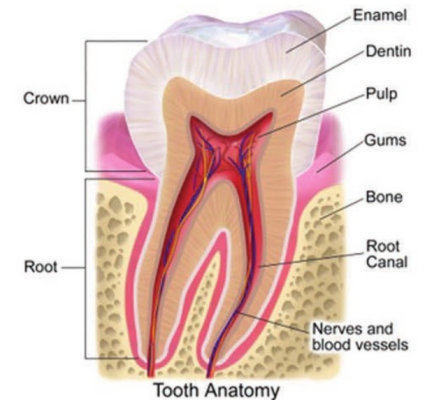
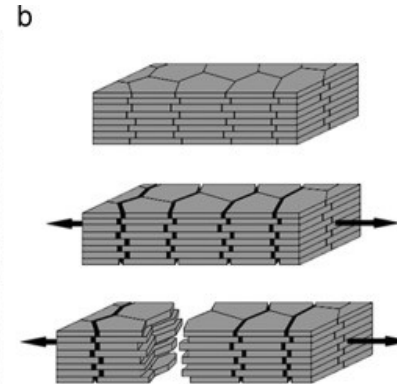
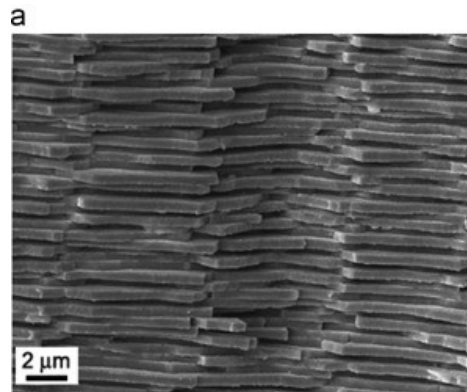
Fiber reinforced composite:



Soft materials, Polymers:

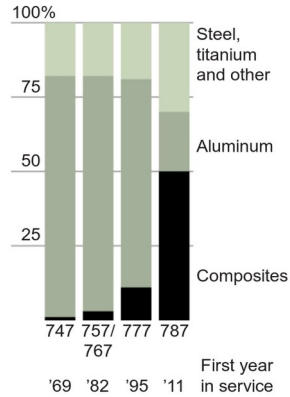
<https://www.youtube.com/embed/9N5SS8f1auI>

Bio-mimicking materials:

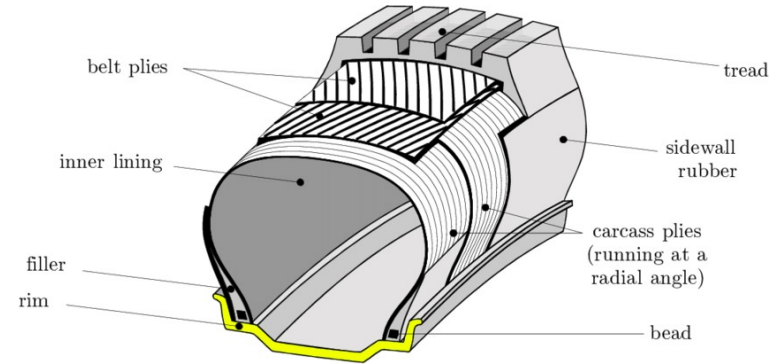
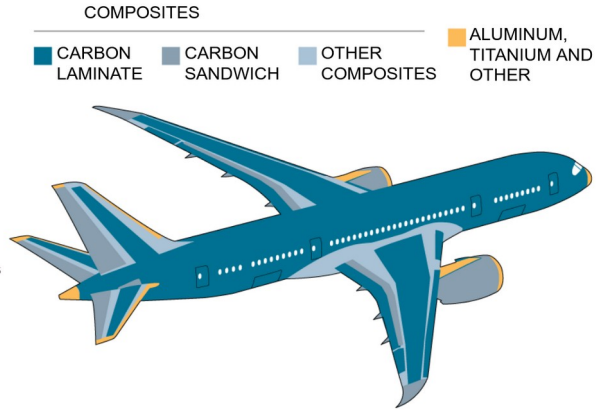


Application of Advanced materials

Materials used in Boeing planes



Boeing 787 Dreamliner skin structure



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.