APL 104: Solid Mechanics
Lecture 1: Introduction

by

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COURSE STRUCTURE

Course Structure

Course website: https://coursesam.github.io/APL104F24/

Class timings: Tue, Wed & Fri (9:00 to 10:00 AM) at LHC 308

Tutorial Session: Tue (2:00 to 3:00 PM), Location (TBD)

Grading (tentative)

Component	Scores
Quiz #1	15
Minor	30
Quiz #2	15
Major	40
Total	100

Course Attendance

Students are highly encouraged to attend all classes. **Students who have failed this course were found to have attended less than 60% of the total classes on an average**. If any student has less than 75% tutorial attendance, he/she will get one grade less than would have been awarded. In case of unavoidable absence, such as illness, please send an appropriate email **within a week before/after absence** with an email subject specifying the subject code APL 104.

Policy for Cheating

Both copiers and copyees are guilty of cheating and will receive an equal penalty. The penalty includes a zero mark on the corresponding exam. Please do not do anything you might regret.

Course References

Course References

This course is based on three textbooks:

- Archer, Cook, Crandall, Dahl, Lardner, McClintock, Rabinowicz, Reichenbach, "*An Introduction To The Mechanics Of Solids*", Tata Mcgraw Hill, 2012
- Kumar, Ajeet, "*Solid Mechanics for Undergraduates - Using Vectors and Tensors*", White Falcon Publishing, 2024.
- Hibbeler, R. C., "*Mechanics of Materials*", Prentice Hall, 2014
- Srinath, L.S., "*Advanced Solid Mechanics*", Elsevier, 2018.

Other references

- Solid Mechanics (NPTEL) by Prof. Ajeet Kumar [video link]
- Timoshenko, S.P. and Goodier, J.N., "*Theory of Elasticity*", McGraw Hill, 2017.
- Sadd, M.H., "*Elasticity: Theory, Applications and Numerics*", Elsevier, 2005

What is solid mechanics?

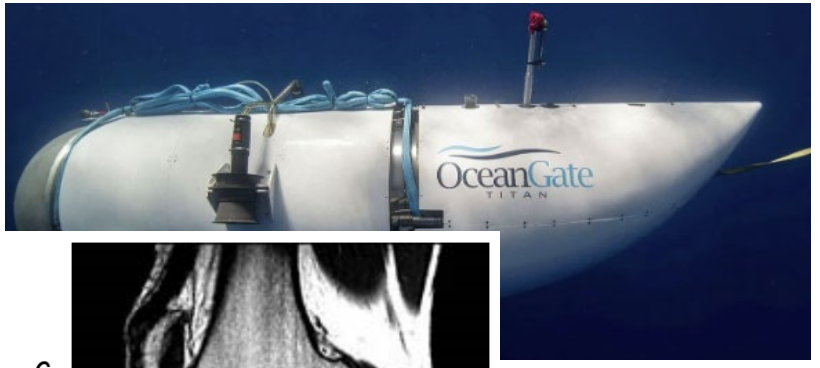
- Solid mechanics is the study of the deformation and motion of solid materials under the action of forces.
- It is one of the fundamental applied engineering sciences, in the sense that it is used to describe, explain and predict many of the physical phenomena around us.
- Here are some of the wide-ranging questions which solid mechanics tries to answer:

When will this cliff collapse?

When will these gears wear out?

how do you build a bri
which will not collaps

why does nature use the materials it does?



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e submersibles?

More applications of solid mechanics

how did this Antarctic ice fracture?
what materials can withstand extreme heat?

how much will this glacier move in one year?
what damage will occur during a car crash?

what affects the quality of paper?
(shown are fibers 0.02mm thick)
how will a ship withstand wave slamming?

how strong is an eggshell and what prevents it from cracking?
how thick should a dam be to withstand the water pressure?