TAM251_Chapter0_prelecture_Johnson

Sunday, June 13, 2021 11:28 PM

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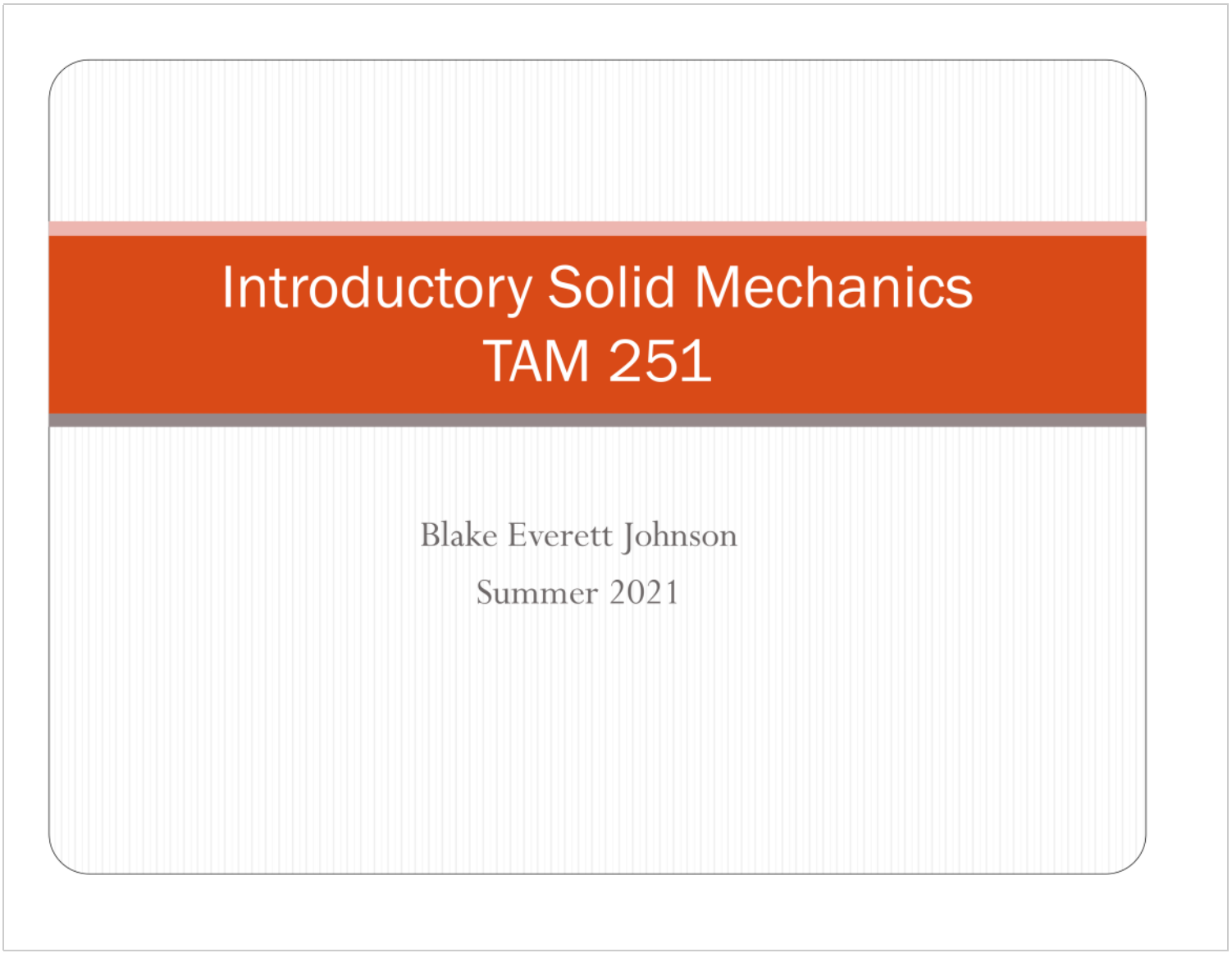


TAM 251 team

Instructors:

- Prof. Blake Everett Johnson

TAs:

- Jaekwang Kim
- Yaswanth Sai Jetti
- Logistics questions, office hours, Piazza, gradebook (Compass), etc.

See TAM 251 web site for more information

- http://courses.engr.illinois.edu/tam251/

About me

Education

- B.S. Engineering Mechanics, UIUC
- M.S./ Ph.D Theoretical and Applied Mechanics, UIUC
- Specialty: Experimental Fluid Mechanics

Some projects I have worked on

- Experimental Measurements of Heated Jets in Cross-Flow
- Studies of Film Cooling Effectiveness in Gas Turbine Engines using Mass-Transfer Analogy
- An Analysis of Effective Leadership Styles in a Mechanical Engineering Capstone Course

Courses taught

- Statics, Dynamics, Solid Mech's, Fluid Mech's, Capstone Design, Heat Transfer (Lab), TA Training (Grads), Illini Hyperloop

Of related interest

- Part-time elementary schoolteacher at the exclusive Johnson Academy of the Arts and Sciences

Hobbies

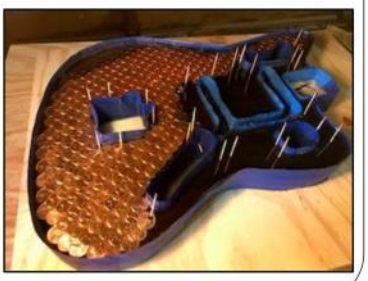
- Family, guitar, cooking, woodworking, home projects

Politics

- Proudly unaffiliated, so don't blame me for anything!

Faith

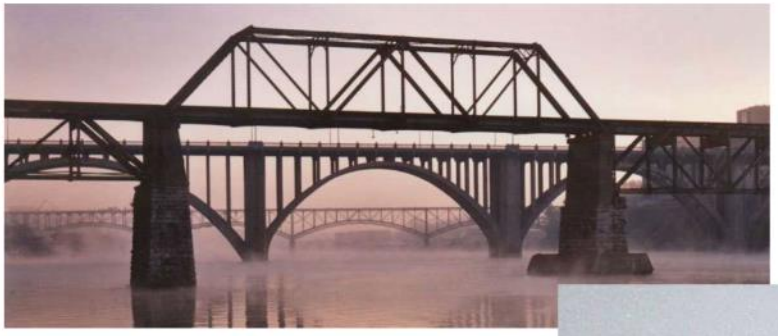
- Christian



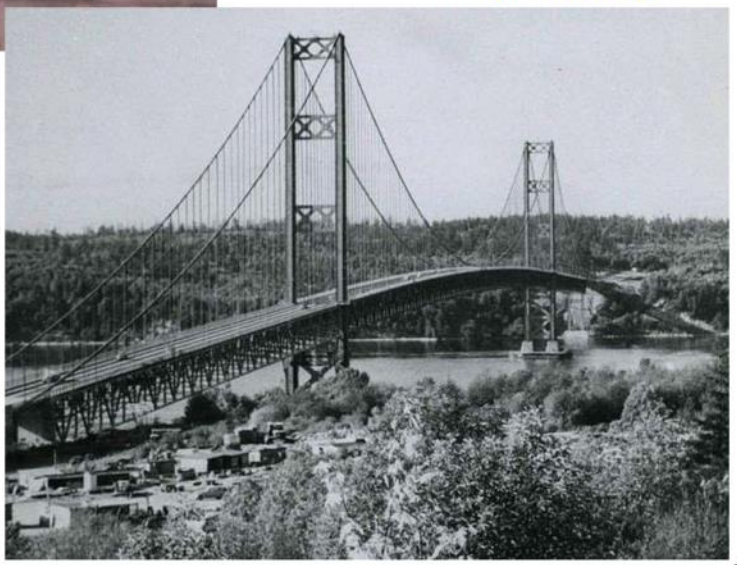
What is solid mechanics?

- We wish to predict the behavior of solid materials when subjected to external loads
  - How much will a solid stretch/bend/deform under a given external load?
  - How much force/torque is needed to break a solid?
  - How can we design solid structures against failure?
- TAM 251 builds **directly** off of everything you learned in statics (TAM 210/211)
  - A fundamental understanding of statics will be key to your success in this course

Objective: predict bending/breaking



Tacoma bridge



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

Objective: predict bending/breaking

How much force do you think is required to crush the concrete cylinder shown here?

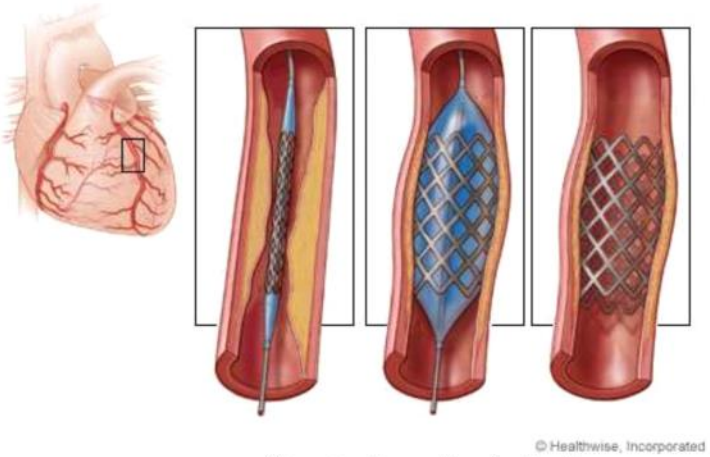
A) 100,000 lb
B) 300,000 lb
C) 1 million lb
D) 3 million lb
E) 10 million lb

UIUC, concrete crusher (Talbot Lab) https://youtu.be/HBBQc94OcNM

Objective: predict bending/breaking

Burst pipe

MMA fight



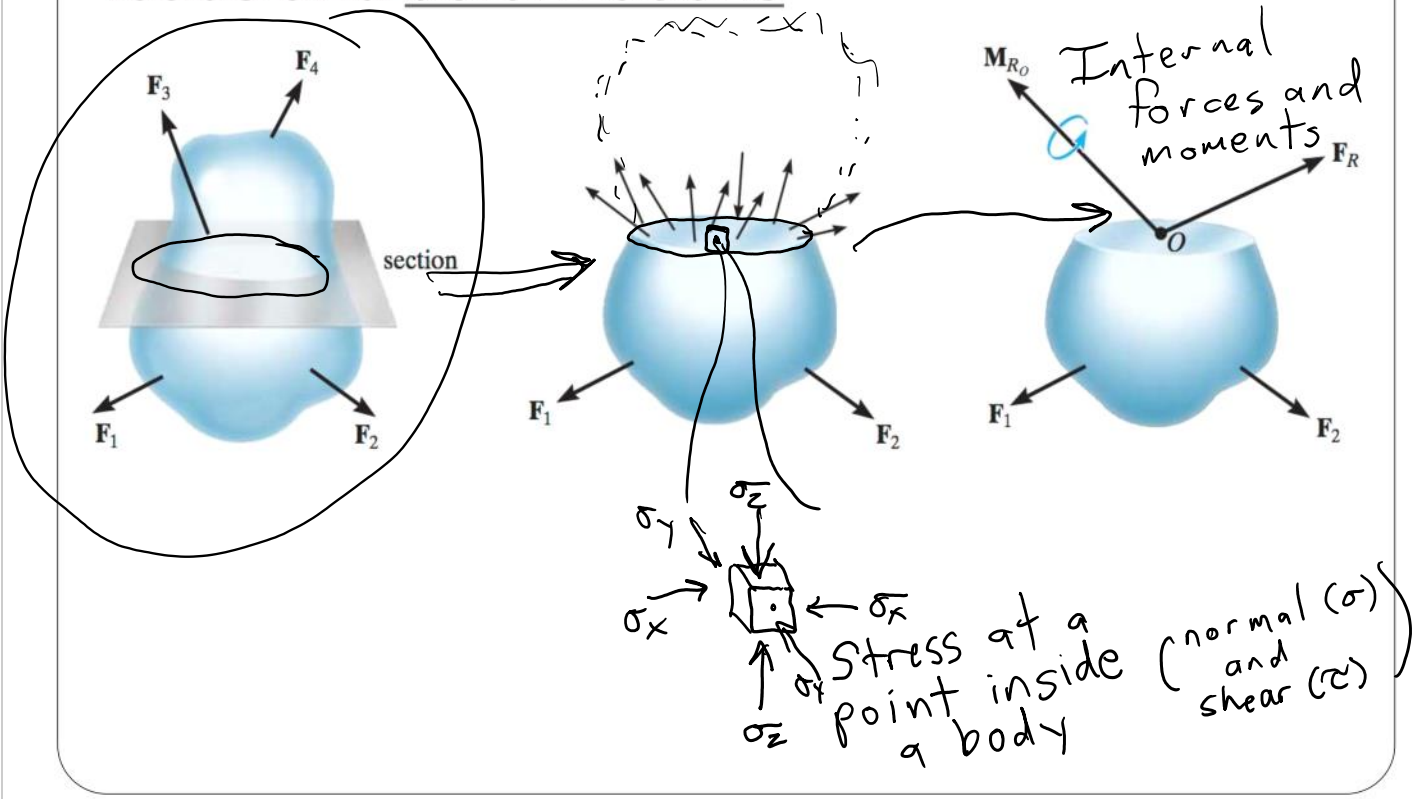
Stent to keep blocked valve open

Objective: predict bending/breaking

How can we design this deck so that it is safe?

- How far out can it extend?
- What kind of material should we use, and how much (e.g. thickness?)
- What kind of supports do we need at the base of the deck?

Big idea: connect external loads to internal loads and deformations



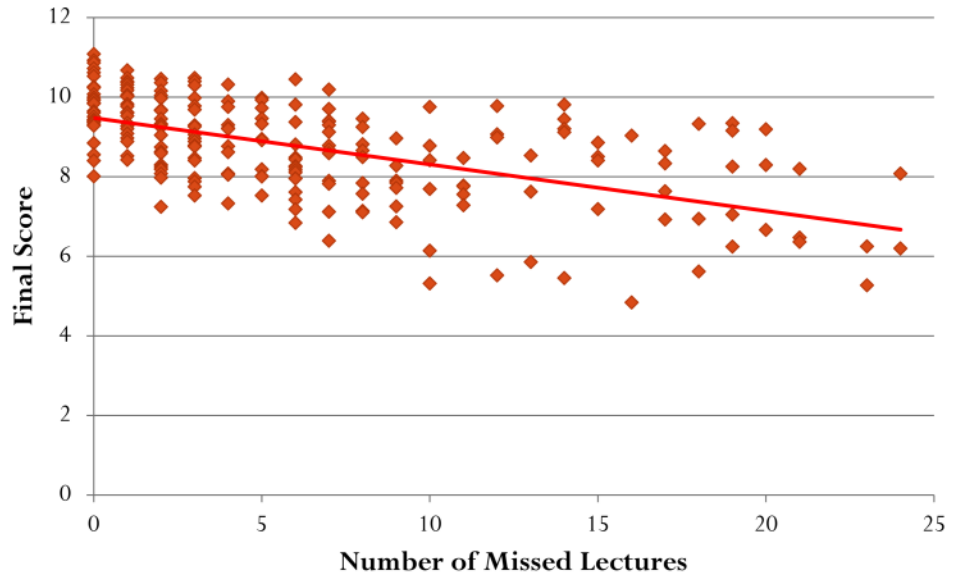
TAM 251 online – what's different?

- Zoom polls replace iClickers for class interactions and attendance.
- Exams: administered via CBTF Online. Weekly on Fridays, see course schedule page for exact dates. Please review https://cbtf.engr.illinois.edu/cbtf-online/index.html
- No live lectures on Fridays: will post a recorded lecture and/or notes in lieu of a class meeting.
  - (Except this week. I'll see you here live at 10 am on Friday!)
- No face-to-face meetings of any kind – discussion and office hours conducted fully via Zoom.

How to succeed in this course

- Know Statics! This is fundamental to succeeding in TAM 251.
  - See HW 0 (not for credit) for some statics practice problems
- Master the material
  - Understand the problem-solving methods needed to complete questions, rather than memorizing question types, formulas, and solution steps
  - Can you solve a question more than one way? Try it!
  - Did you get a HW question wrong on your first try? Why was it wrong? Figure it out!
  - Explain your HW solution or problem-solving strategy to a friend
- Don't be afraid to ask for help
  - Piazza: ask questions, engage with course staff and classmates to understand solutions
  - Office hours: we have coverage every weekday, except Friday
- Get comfortable with PrairieLearn and the CBTF for exams
  - Get comfortable with a good calculation tool like Matlab, Mathematica, or Python
  - Get familiar with the online policies and procedures for this semester.
  - See http://mechref.engr.illinois.edu/pol/pltips.html for additional tips

Class attendance = success!



Student Code & Academic Integrity

"All students are responsible to refrain from infractions of academic integrity, conduct that may lead to suspicion of such infractions, and conduct that aids others in such infractions."

"I did not know" is not an excuse.

The following are academic integrity infractions:

- Cheating - using or attempting to use unauthorized materials
- Plagiarism - representing the words, work, or ideas of another as your own
- Fabrication - falsification or invention of any information, including citations
- Facilitating infractions of academic integrity - helping or attempting to help another commit infraction
- Bribes, Favors, and Threats - actions intended to affect a grade or evaluation
- Academic Interference - tampering, altering or destroying educational material or depriving someone else of access to that material

(source http://www.provost.illinois.edu/academicintegrity/students.html)

– ***Violators will be caught*** – we check!!

Please report any concerns immediately to your professor.

- **Academic integrity infractions, harassment, and discrimination of any kind will not be tolerated.**
- Academic integrity infractions **will be dealt with using the most stringent available counter-measures.**
- All infractions are documented through the campus-wide FAIR database, that remains part of the student's permanent record.
- Typical penalties in TAM 2XX courses for academic infractions include dropping one course letter grade. Students have been expelled from the university for cheating.
- Infractions include, but are not limited to, cheating, plagiarism, and assisting others in a manner not prescribed or allowed for in the original assignment or directions.
  - **Homeworks** are 'formative' assessments, meaning they are intended to foster learning (students are encouraged and allowed to work together!)
  - **Quizzes** and exams are 'summative' assessments that measure individual student mastery of course concepts, for which students are of course **forbidden** from assisting each other.
- Computer-based testing deserves special mention. This testing is typically given across multiple days. **During the entire time period of testing, students are strictly forbidden from discussing any aspect of the test/quiz whatsoever with other students.** This includes specifics of questions, general aspects of questions, comments on the difficulty of the quiz, etc. This policy is strictly enforced to preserve the integrity of the computer-based testing.