What was your motivation to take this class originally?
- More applications of continuum mechanics and finite element analysis
- To apply simulation techniques for real biomechanical problems
- Wanted to learn more about growth processes, how forces can affect growth
- My advisor recommended it, I was going to wait for the class’s second incarnation but I’m glad I caught it the first time though
- Interest in applying modeling techniques to research
- I am in the process of moving my research towards a biomechanics emphasis

Were your original interests covered in class?
- Yes
- I worked with real examples of bone remodeling which made me interested in this field
- It was a bit more mechanics than I expected and some of the growth laws are still ambiguous to me
- Basics of finite element modeling were covered, growth theory was deeply covered, matlab code was unexpected and great, thanks for doing the examples in matlab
- Not as much as I would have liked, the initial theory was too much at times and building it up piece by piece would have given a more mechanical understanding, so that I can go off and use it later on
- Yes but unfortunately I lacked the background to fully understand the material

What will you remember about this class?
- Material level, internal variables, update schemes for internal variables, staggered solution
- Bone remodeling, growth mechanisms
- Fun to talk about project, visiting Thor’s lab, growth debating over flux
- Difficult theory put into organized matlab code, from here on out I’ll try to think about whether or not I can apply growth laws to my problem
- Bones! Solid mechanics, finite elements is not as easy as I thought that it would be
- The mechanical engineering concepts were over my head! Good material though. It was unclear what work I was responsible for.

What do you think about the teaching material used in class?

Slides
- I personally prefer white board presentation of important equations but slides are great for graphs, pictures and examples
- Good
- A little too many, somewhat repetitive, but nice to have equations already written
- Excellent, good record of class
- Very good! Could tell that you put a lot of time into them
- Good

Handouts
- Good
- Nice of you to bring them for us
- Very nice
- Full color pdf’s online
- I always went back of the pdfs and took notes in my own notebook, so never used handouts & save trees
- Good
Matlab code
- Very good
- Didn’t get a chance to play with it, but maybe a broader overview would be better, don’t need line by line comparisons since we have the eqns
- A lot of them, but helpful to have an organization chat
- My favorite part – no one ever gives away the code. It’s very exciting to work with your code
- It was fun using it to see results, but I would have liked to do coding homeworks too
- Good

Internet access, course webpage, updates
- Okay
- Good. In coursework you can also instantly upload materials
- Great!
- Slightly hard to use
- Awesome, wikis rule!
- Excellent

What did you like about this class?
- Theory to model real problems
- Range of topics, link between theory and application
- Surprisingly thorough continuum theory for having such a short time frame (we take weeks in 335C to go through nonlinear elasticity)
- It covered a broad range of things
- Had a set project focus
- I liked that we had the whole quarter to internalize through the theory (which was tough though) but we got to work with examples starting ½ way through
- I understand now that not much is known about bone growth and that there is a disconnect between cell bio research and mechanics people.
- It made me think a lot about biomechanics and of new things to do
- Access to material for my future learning of mechanics
- Good lecturer though hard to understand at times

What could be improved?
- Starting the project earlier by defining a problem
- A bit more structure to course schedule
- Some stuff very ambiguous
- A little too superficial, very fast over basics, I think if you didn’t already know it, you wouldn’t gain much
- A little slow sometimes
- More hands-on
- One week homeworks, for example go over code with small simple models, or rather go over the equations and have students implement for a 2-3 node system, use toy models, and then keep building on it so that each homework adds on to the last
- More structure. Possibly further prereqs. I lacked the background to really understand the material. Mini (!) homeworks might have helped
- Smaller and more assignments i.e. give Dirichlet BCs to define the constraint and calculate stress tensor for this configuration

What should be kept the way it was?
- Good matlab codes
- Illustrative examples were good, particularly for some of the more involved theory
- Project at the end
- The idea of a project but maybe do on a person by person basis using homeworks
- Keep the lectures and group project
- Website
- Class project is good
- Continue using matlab code to do simulations
Which aspects of class would you like to be covered more / less in the future?

more / less theory and equations, because …
- More, gives more knowledge
- More, personal interest :-(
- Less, too many, difficult to see what is important, too much, wouldn’t learn it if you didn’t already knew, focus on growth laws would be good, you also brushed over a lot of it saying it wasn’t important to understand
- More or the same but perhaps prereqs, more, more tie-ins with the world of biology
- Less but immediately implement them in matlab as homeworks
- Less but more theory homework out of class, e.g. write growth law what part or the constitutive equations go to zero in given model

more / less simple analytical examples, because
- Less
- More, goes with the theory and equations
- More, the other theory and equations can come from other classes, I don’t think the class should be spending much time on basics
- More or the same but perhaps prereqs, more, more tie-ins with the world of biology
- More, examples are super useful, because we are not very experienced with FEA, growth laws or programming

more / less finite element algorithms / matlab, because
- More, useful for familiarity
- About right, but I didn’t think line by line was necessary
- More, the other theory and equations can come from other classes, I don’t think the class should be spending much time on basics
- More or the same but perhaps prereqs, more, more tie-ins with the world of biology
- More but require that we do them as homework, like 8 hour/week or two weeks
- Good practise, coding is not scary once you are been through it a couple of times

more / less group projects
- More, cooperation can help to learn more
- No opinion
- I think one group project is really all you can do in one quarter
- Good level for the course
- Less, more individual work, large groups tend to encourage the mentality that ‘someone else will do it’
- Good amount

more / less flexible syllabus to adapt to students’ interest, because
- more, very good opportunity to show creativity
- less, harder to get into time frame of quarter system
- Fine as it is, but maybe have it planned out ahead of time, so that we know what to expect before taking the class
- Good flexibility
- More but plan interest early
- Keep it flexible, but more structure is definitely better for Stanford students

What kind of grading basis / grading system would you suggest in the future?

Homework (if so how many, graded or non-graded)
- Bi-weekly, maybe graded
- More, but non-graded, one assignment per week (small!)
- Of at least two graded
- Small weekly homework, graded generously
- Approximately 5 homeworks
One final examn / three small examns
• not really appropriate
• possibly, maybe ½ hour quizzes
• I would learn the material better with an examn but I don’t feel I learn enough to really master one on growth in this class, would I then fail this examn?
• The class would have to be more structured for this, maybe three small examns

One final project based on a poster or paper
• tough to grade
• yes II
• the idea is good but scheduled too lated
• small, individual project, for example have them pick something they want to model or something from literature

Would you like to see a final result of the class?

Poster session / project presentation
• Project presentation
• yes, but better for students in groups of 3-4
• project presentation is the most reasonable
• project presentation and optionally pursue to conference submission

Conference contribution poster / paper
• hard to time
• better for a small class
• optionally pursue to conference submission
• yes

Final journal paper of the group
• hard to time
• yes
• better for a small class

Perhaps the course could be expanded to be co-tought with someone from the biology (only) dice (e.g. and orthopaedic surgeon, a developmental biologist, a musculo-skeletal radiologist, etc). In BioE220, they used this dual expertise format to great result (i.e. radiation/imaging physicist paired with a radiologist)