Project Pitch and Chalk Talk

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After I completed my Master's degree, I went to work as a professional engineer, and soon found myself on complex projects that did not align with my educational training. When I mentioned this to my boss, his response was, "This is why we hired someone with a Master's degree." The expectation was that someone with an advanced degree should be capable of independently training themselves, and this has become one of my core learning objectives for any graduate class I offer.

Early in the semester in CEIE 612, each student picks a topic that they are interested in. I give them a list of suggested topics, but going off script is encouraged. Midway through the semester, the students give a five-minute "pitch talk" to sell the importance of their idea to the class. Towards the end of the semester, each student is allocated a portion of class time. They prepare a lecture in whatever format they wish, and then they teach the entire class. Their lecture notes are shared with everyone, and there is a peer review component.

I recall one student, in the middle of a whiteboard session, turning around and exclaiming "this is way harder than it looks as a student!" Of all the project-based learning I offer in my classes, this is probably my favorite, because I get to learn along with the students.

Course Project Guidelines

An important skill for any engineer is the ability to teach yourself a topic you are unfamiliar with and then to explain what you have learned others. This is true regardless of whether you work as an academic or as a professional engineer.

For your course project, you are to choose a topic that we will not cover and study it independently. Over the course of the semester, you will give two presentations on your topic. The first will be a short 5-minute "pitch talk" that introduces your project. The second will be a more formal "chalk talk" that works through the technical details. At the end of the semester, you will produce a set of lecture notes (3-5 pages) on the topic which should include a small example problem or case study.

Choosing a Topic*:* You should select a topic that is interesting to you and is related to what we have done in class. It is strongly recommended that you select a topic that is well-documented (in textbooks or otherwise) to minimize frustrations. A short list of suggested topics is provided below. It is by no means exhaustive, but if you would like to work on a different topic, please discuss it with me first.

Note: In order to make the presentations more interesting, each student must select a different topic. Topic selection is "first come, first served."

- Beams: curved beams
- Beams: beams on elastic foundations
- Beams: deep (Timoshenko) beams
- Beams: nonlinear fiber models methods
- Nonlinearity: Newton-Raphson algorithms
- Nonlinearity: advanced material models
- Composite material behavior
- Stability: inelastic buckling
- Stability: torsional buckling of beams

- Plate theory
- Thick-walled cylinders
- Torsion
- Experimental stress analysis

***Report Guidelines*:** The lecture notes should have four primary sections, although some topics may have slightly different formatting.

- Presentation of the topic: Why is the topic important? Where is it used? What makes it different than similar problems (example: why won't classic beam theory work for deep beams?)
- Derivation of the solution: How do we get a useable model or technique? What assumptions are being made? What does the result look like?
- Presentation of an example problem: Develop an illustrative example problem that can be used to teach others. Don't copy a solution out of a textbook. Be neat and clear in the presentation of your work. Hand calculations are acceptable, but sloppy and disorganized calculations are not.
- Conclusions: What are the limitations of the model or technique? What are the challenges to actual implementation? What does the example problem illustrate?

***Class Presentations*:** Over the course of the semester, everyone will present twice on their topic.

- The first talk will be a 5-minute pitch talk. You should present your general concept, and why it is relevant for everyone to learn about it. Focus on the key problem/topics and potential applications. This should be fun, so be creative! Imagine you are on the show "Shark Tank," and you are trying to convince the class to invest in your idea.
- The second presentation will be a more formal lecture on your topic, about 20 minutes in length. The goal should be to present the important points of your topic, but 20 minutes is not enough time for an in-depth discussion. You may use PowerPoint or the whiteboard for your talk. In order to make sure we have enough time for everyone, I will be enforcing the time limit strictly.

***Grading and Evaluation**:* The overall project is worth 30% of the total course grade. The report is worth 15% and the presentations are worth 15%. You will be evaluated on the following:

- Report accuracy
- Report clarity and organization
- Depth and quality of the presented study
- Presentation clarity and organization