The PSU/CS Capstone Model

- Teams of 8 students
- Project Lead + Engineers
- Project Lead is responsible for
  - Planning - WHAT gets done, WHEN it gets done, HOW it gets done
  - Organizing - WHO does it
  - Directing - getting people to do it
  - Monitoring - making sure it gets done as planned
Admission Requirements

- CS300
- CS311
- CS333
- CS350
- CS320 or CS321
- Programming Intensive CS Elective or CS321
- Don’t meet these requirements? Appeal
  - *Must be able to convince us that your graduation will be substantially delayed if you take Capstone in the Fall – review your DARS, we will*
  - *Must have demonstrated experience with reasonable (~1,000 LOC) sized software – send code YOU wrote*
What past students have said ...

■ I learned some creative ways to be on time to meetings even with a busy schedule; I learned about some testing and development tools that I hadn't used before; and I had a really great experience working on a product with a diverse team. I'm incredibly proud of the product that we created! It was an ambitious and open-ended project, and I think we stepped up to the task; my personal areas of expertise weren't used much in this progress, but instead I got to learn new things that I wouldn't have learned otherwise.

■ I got a good understanding of how software development works in a team setting. I also learned a lot about testing frameworks. I am proud of our project. I think we created exactly what our sponsor was asking of us, and we did so in a timely manner without any delays. I am also proud of my role in the project. Going into the project, I knew nothing about Javascript or library development. I was able to learn very quickly the things I needed to know in order to complete my tasks.

■ Communicate, communicate, communicate, communicate! This was the first time I ever worked in a team on the same program, and I was not mentally prepared. You practically need to be talking with your teammates every day, lest you fall behind and not recover. Most of what I learned followed this theme. I learned how to use Git on a team and resolve sometimes very sticky conflicts, I learned the importance of delegation and code reviews, and I learned just how important a resource your teammates can be. Beyond this, I also learned about android and databases, though I consider these less important.
This capstone course is the best course I've ever had. I learned the concept of what is software engineering process about, how to work as a team, improved my weakness skill which is communication. And yet, it is the most close to real word experience in the industry.

... I also learned how to collaborate with the other devs on our team, using Agile SCRUMs and GitHub, which was a new experience for me. I feel like I got a taste of what it's like to work in the SDE industry.

I learned a lot from this project. Not just technical skills-wise but how to communicate, understanding problems, working with team member to find a solutions, filling in if there's shortage in team and doing my part of the project. I learned about Full stack development, making decisions when sponsors do not communicate well, version control in real project. It was my first time using Git VCS in an actual project to contribute. Using git, I learned how to do Code Reviews, resolving merge conflicts and making Pull requests. This group had one of the best project team members and team lead out of all of the project I have done. I wish I get another chance to work with these guys again. Thanks. I am really proud of what I did in the project and my contributions.
I learned a lot from this experience. I have never led a project like this. This experience gave me a new appreciation for the work that goes into leading a development team. I had to learn a lot about delegation. I also learned a lot about communicating with 'customers'. I am really glad that I was given this experience.

I learned a whole group of new technologies. I also learned about how to work in a larger team dynamic, and learned to look past exactly what I'm told to do and think about what I am accomplishing by doing it, in order to clarify exactly what needs to be done. I learned how to collaborate on issues with other team members, and what good team communication looks like. Also, I believe I've learned how to interact better in group meetings, and know what a good team dynamic looks like now.

I learned how to work in a large team on a collaborative project. The team had a variety of different people with different skills which I had to adapt to and make sure we are all on the same page, at least from my perspective. Overall I enjoyed working with this project with my team members. We finished the project in a timely manner and met our goals, so in that way I am proud of our product and how I contributed to it.
... and more ...

- This was by far the largest team I've ever worked on. Also, it is the only team I've worked with where I was the most knowledgeable developer. It taught me a lot about communication, using git with more than a team of 2 or 3, and how to teach others new skills and technologies.

- I learned about team dynamics and the pros and cons that come with them. I have never really been road blocked by another person before because most of my projects have involved 2-3 people all working on separate portions of the project that can move forward intendant of each other. I learned how nice it is to have a group of individuals to bounce ideas off of and get ideas from. I also thought that pair programming sounded like a weird cumbersome way of doing things, but it does really help both parties. I learned quite bit about using version control in a larger group.

- It is important to trust team members to do their jobs correctly. You can't always be closely familiar with an entire project's code.

- I learned how to work with a large group of people and tackle the new technology. I also learned how to resolve personal conflict between team members amicably.
... we’ll end it there ...

- I learned far more from this Capstone experience than I did in all of my other classes combined. We were working under real-world conditions for a real client, being forced to learn new and unfamiliar tools and technologies along the way. I came out of this with greater confidence in my web development abilities and some skills which look great on my resume.

- Learned a lot of new technologies and processes, but besides that I learned about real world projects and the problems you can run into. Corporate response times are slow. Learned that communication is not always natural between any given two people, some people understand things differently than others.

- I felt like I learned a lot from doing this Capstone project. I did learn some new technical skills, but I felt the most important thing was how to really work in a team. I've never gained any real teamwork skills in school, and I've never had a real job to get it from there.

- I learned a lot about communication and how different people react in the same situation. It seems like the most difficult part of working together as a group on a project isn't necessarily the difficulty of the project itself, but of figuring out how to work cohesively as a team, especially when certain personalities are much different than each other.
Skills for Developing Software Products

- Very few software products are built by a single person in the 21st century
- Teamwork skills
  - Organizational/Coordination
  - Communication
    - With the customer (external)
    - Within the team (internal)
- Planning/Documentation
- Technical – just-in-time learning instead of just-in-case
- Creativity/Problem Solving
Schedule – **April 3 to August 31**

- **Weeks 1-3**
  - Organization

- **Weeks 4-6**
  - Sponsor Presentations/project selection
  - *May 8 @ 6:40PM – Project request/selection presentations*

- **Weeks 7-10**
  - Teams work on developing the problem and planning the implementation
  - *June 12 @ 7:30PM – midterm project presentations*

- **Weeks 11-18**
  - Teams implement their project

- **Weeks 19-21**
  - Project delivery, feedback and presentation
  - *August 31, 2017 @ 7:30PM – final project presentations*
Commitments

■ You make a commitment to your team and your sponsor
  - Delivering on your promises and pulling your weight
  - Showing up on time to meetings and team events
  - Participating in discussions
  - Accommodating each other’s schedules
  - Presenting solutions, not problems
  - Helping each other – be a resource, not a roadblock
  - Abiding by team rules
What Do These Commitments Mean?

- A Capstone student is expected to work a minimum of 10-12 hours per week, and often 16 hours per week, over 20 weeks. (Summer Term Capstone will be a ten-week course offering, not eight weeks.) You can expect to put in about 200 hours of work once the project begins. Work is weekly with mandatory weekly standups.

- You must be available continuously during the entire 20 week period. This includes mandatory weekly team meetings. If any lengthy absence is planned during the Capstone, you should wait for a later offering.

- Capstone will require significant out-of-class time, including out-of-class collaboration. You will need a reasonably flexible schedule to be able to accommodate this. Students must keep the Monday night Capstone class period available for the entire 20-week duration of the Capstone: this is when many team meetings and other activities will be held.

- You are required to attend and present at the Intermediate Project Presentation (end of first quarter) and the Final Project Presentation (end of second quarter). Students not attending this presentation will fail the course.

- All students (including Team Leads) will contribute to all aspects of their project. Students must be comfortable with programming, including potentially learning a new programming language, as well as with documentation and communication.

- You must be able to work in a group: to take and give direction as appropriate, and to be collegial and cooperative co-workers. Any incident of unprofessional behavior (racism, sexism/genderism, harassment, abuse, etc.) will result in immediate removal from Capstone with a failing grade.
What We Need From You

- Barbara’s info sheet/contract
- You being registered by March 3
- A copy of your resume once you are registered (I will send you a template) – I need it back no later than March 27
- If you are interested in being a Team Lead, let me know – it will require pre-term meetings and training sessions scheduled outside of class
- Get the text and start reading it before the term begins:
  - *Head First Software Development: A Learner's Companion to Software Development* by Dan Pilone (Author), Russ Miles (Author) published by O’Reilly - ISBN-10: 0596527357