

# Capstone

UC Santa Barbara

- Two quarter project class in which students put their education into practice by building a significant system as a team
  - Learn by doing, teaching yourself and each other
  - Chance to explore the latest technologies and SWE practices
  - Provide practical experience as a form of career building
- Capstone flavors
  - ECE 189 A/B for EE and CE students
    - Focuses on development of a hardware prototype
    - Runs **Fall/Spring** every year so chips can be fabricated during the Winter
  - CS 189 A/B for CS and CE students
    - Software systems engineering oriented
    - Runs Fall/Winter to allow continuity and more extensive projects
  - **Must take both courses in a single series (CE and CS) for grade**
  - There is also a **year long** EE Capstone and ME Capstone

# The CS Capstone: How Does It Work?

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- Industry Driven
  - Top companies “donate” challenge problems that they wish to explore as R & D
  - Student teams develop prototypes in collaboration with industrial **mentors**
  - Goal: develop and understand the next industry-leading technology, drive an idea **from design to working prototype**
- Culminates @the CS Summit! in March of Winter quarter
  - Present it to the College, community, your peers, ... the world
- Awards given for best projects!
  - **Judging criteria**

# Capstone Award Judging Criteria

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- **5pt Science:** Has the project demonstrated application of important, interesting, or new aspects of Computer Science? (e.g. Use of machine learning, non-trivial algorithms, solid distributed system design techniques)

**5pt Practice:** Did the project adhere to techniques that represent the state of best practice in industry throughout the development of the system (e.g. repo workflows, test-driven development, issue tracking, or use of static or dynamic analysis tools)

**5pt Scope:** Has the team attacked a problem of significant (but appropriate) scale and complexity. Does the problem require the development of significant new code and/or the integration of complex exciting parts that are not normally made to interface to on another? Was the project able to complete the goals that it set for itself?

**5pt Teamwork and Presentation:** Do all the members of the team contribute significantly (in their own ways)? Does the team take the process seriously and communicate effectively with one another and the mentors? Is the project presented both in written and spoken form in a way that is compelling and impressive? Has the team developed an impressive demo?

# Capstone Series Overview

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- Teams of size 5 (teammates added by instructor if less)
- CS189A
  - Project vision
  - Requirements and design documentation (PRD v1 and v2)
  - Prototyping and initial implementation (code!)
    - Including testing
- CS189B
  - Complete implementation (debugging, robustness, performance, analysis)
  - Testing and verification
    - Including user studies
  - Optimization and extension (awesome features!)
  - Presentation
- Some lectures may be given by industry experts (see schedule)
- [http://capstone.cs.ucsb.edu/cs189a/cs189a\\_sched.html](http://capstone.cs.ucsb.edu/cs189a/cs189a_sched.html)

# CS189A Syllabus

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- CS189A
  - Introduction to Software Engineering
  - Team formation and management
  - Software development processes
  - Project management
  - Software specification
  - Software design, system modeling, and SW architectures
  - Prototyping and implementation
  - Open source software
  - Testing and verification
  - Tools and technologies
- [http://capstone.cs.ucsb.edu/cs189a/cs189a\\_sched.html](http://capstone.cs.ucsb.edu/cs189a/cs189a_sched.html)