High-Level Course Goals

• Student will understand design as a process.

• Students will apply core engineering skills to the design process.

• Students will appreciate the challenges and complexity of the design process.

• Students will appreciate design as a process for taking an idea or need from concept to realization of a deliverable (component, system, process).

• Students develop key professional and project management related skills, and understand their relationship to the design process.

• Students appreciate design as the culminating ability and skill arising from their studies.
4900/4901.XX : ME Capstone Design

• Prof. Marzette’s Course Philosophy

A student’s capstone experience should be memorable, enjoyable, and fulfilling, while bringing together the deeply analytical aspects of the engineering curriculum with the fundamentals of design, and basics of engineering management (i.e. practical).

• Changes: Since each capstone will have its own 4900 (or ghost 4900 course) course will shifting to a year long integrated full two-semester capstone experience. Summary: We’ll dive into projects sooner.

Sequence: ME4900/4901.01/4901.02
Initiation → Planning → Execution → Monitoring and Controlling → Closeout

PM

Initiation

Planning

Execution

Monitoring and Controlling

Closeout

SE

Problem Definition

Concept Development

Detailed Design

Fabricate, Assemble, or Code (i.e. “build-to”) Design Documents

Integration and Verification to Design Documents

Integration and Verification to Requirements

FEEDBACK CYCLE

FEEDBACK CYCLE

FEEDBACK CYCLE

FEEDBACK CYCLE

RR = Project, Product, Client, and/or User Requirements Review

IDR = Initial Design Review (Concept Review)

PDR = Preliminary Design Review

FXN = Functional Demonstration

CDR = Critical Design Review

Note: Feedback cycle factors into risk management and enables agility.

DE

Plan

Design

Build

Test

Deliver

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Where do projects come from?

- **Buckeyes**: Community
- **Industry**

- SPR2019 term over 50+ student project ideas submitted.
- SPR2019 30+ project options offered to 95 students.
How are projects and teams chosen?

Students are surveyed at the beginning of the term for their projects ideas (students are encouraged to recruit others interested).

Students are then surveyed for their top 5 picks, areas of interests, and a short narrative for their top 3 of 5 projects.

Rarely go outside of their top 3 picks.
How are projects and teams chosen?

Team sizes:

• 4 to 6 Generally

• Projects that can be split into multi-subsystem projects 6-10, with multiple sub teams.
Project Mix

SPR2019 PROJECTS

• Anti-lock System Braking for Bicycles 😊
• Auto Guardian
• Autonomous Chess Board 😊
• Autonomous Lawnmower
• Autonomous Quarter Back 😊
• Cam-less Engine Design 😊
• Carbon Fiber Formula SAE Wheels 😊
• Coffee Roaster
• Design Outreach Water Insecurity Solutions 😊
• Develop a Prototype 3D Printer
• Drive Ohio
• Electric Riding Lawnmower 😊

• Fish Team - Platform
• Multi-Mode Drone
• Project Arusha Rover Deployable Medical Workstation
• Robotic Instrument - Reed Organ 😊
• Tackling Human Mobility 😊
• The Help-Me Device 😊
Project Mix

AU2018 PROJECTS
• Cable Driven Parallel Robotic Manipulator
• Develop a Prototype 3D Printer
• Fish Team: Platform Development
• Haptic Feedback System
• Honda: Brake Fill System Study
• Honda: NSX Paint Skid Cleaner
• Honda: Overhead Side Panel Carrier

• Honda: Overspray Collection System
• Honda: Paint Heat Recovery
• HRST: Duct Burner View Port Enhancement
• The Timken Company: Bearing Assembly Cycle Time Reduction
• Truing Machine for Bicycle Wheels
Project Mix

AU2017 PROJECTS
• Honda: Brake Fill Study
• Honda: NSX Super Carrier
• Burning Man Vehicle
• Cable Driven Robot
• Coffee Roaster
• Drone Constraint & Control
• Fish Team: Platform Development
• Make a Model Hand: Force Feedback
• Robotic Guitar
• Strandbeest: Multi-team Project
• Foot Pressure Monitoring Device
• Silverware Roller 😊

SPR2018 PROJECTS
• Automated Lawnmower: Platform Development
• Autonomous Shuttle 😊
• Bicycle Automatic Transmission 😊
• Campus Personal Transport System 😊
• Fish Team: Docking Station
• Fish Team: Platform Development
• Foot Pressure Monitoring Device
• Regenerative Braking - Mechanical Regeneration (Bicycle)
• Robotic |: Instrument:|
• The Hockey Defensive Robot 😊
• Zenith Directional Heading of Multistage Rocket 😊
Examples of Community and Industry Engagement

• **Anticipated Returns:**
  - Honda
  - Timken Company
  - Drive Ohio

• **Past**
  - Aerial Compressors
  - Columbus Police Department
  - OSU Sustainability
  - COSI
  - Steam Factory / Idea Foundry