High-Level Course Goals

• Student will understand design as a process.
• Student will apply core engineering skills to the design process.
• Student will recognize and successfully navigate the challenges and complexity of the design process.
• Student will apply design as a process for taking an idea or need through to realization of a deliverable (component, system, or process).
• Student develops key professional and project management related skills, and understands their relationship to the design process.
• Student appreciates 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: Projects start in week 3 of the semester.

Sequence: ME4900/4901.01/4901.02
Integrated, simplified, and reduced complexity project management (PM), systems engineering (SE), and designing engineering (DE) models.

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.
Where do projects come from?

- Buckeyes
- Community
- Industry

- Depending on the size of the class there are between 20-30 project options offered each term!
How are projects and teams chosen?

Students are surveyed at the beginning of the term for their project's 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?
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

AU2019 PROJECTS

- (** MAE: **) Design, Prototyping, and Testing of a Robotic Prosthetic Hand with a Variable Stiffness
- (** MAE **) Solid State Battery Compression Tooling
- (** Honda **) Wrap Guard Equipment
- (** HRST **) Access Door Upgrades to Improve Sealing Reliability 😊
- (**Caterpillar**) OSU Caterpillar 2019 Will-Fit Fuel Injector Study 😊
- (** Honda **) Stamping Blank Destack Feeder
- (** Honda **) Stamping Die Augmented Reality
- (** Honda **) Parts Shipping Rack Strength Analysis

- (** Honda **) Die Casting Cooling System Analysis
- (** HRST **) Firing Duct Enhanced View Port Prototype Refinement and Testing 😊
- Solar Water Purifier 😊
- Two axis inverted pendulum 😊
- Cable Driven Parallel Robotic Manipulator
- Fish Team: Docking Station
Project Mix

AU2020 PROJECTS

- Climbing Rope Management System☺
- (**) Design Outreach **) Wound Vacuum Pump☺
- Cam-less Engine Design☺
- (**) NASA **) Lunar Excavator☺
- Gravity Battery System☺
- Myoelectric Prosthetic for Quadriplegics - Mechanical Prosthetic☺
- Autonomous QB☺
- Myoelectric Prosthetic for Quadriplegics - Interface and Controls☺
- (**) NSBE **) Project Arusha Rover Deployable Medical Workstation
- (**) MAE **) Develop a Prototype 3D Printer

- (**) MAE **) Design, Prototyping, and Testing of a Robotic Prosthetic Hand: Compact Joint Design
- Inclusive Science - An Interactive Experience for Disabled Explorers☺
- (**) MAE **) The Fine Motor Skills Project
  - Fish Team
  - Coffee Roaster
  - Multi-Mode Drone
Appendices

• Project History
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

KEY
BOLD = COMMUNITY PARTNER
😊 = STUDENT PROPOSED
GRAY = CAPSTONE SPONSORED
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 😊