4901.01/4901.02
ME General Capstone Design
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4901.01/4901.02: 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).

San Francisco black sand beaches along the west coast. Used to design a magnetorheological damper for capstone.
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.
Integrated, simplified, and reduced complexity project management (PM), systems engineering (SE), and designing engineering (DE) models.

Gate Reviews
- PRR = Project Requirements Review
- DCR = Design 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?

- Students
- Industry
- Faculty
- Community
How are teams chosen?

Personal Goal Setting → Students Surveyed → Students Placed on Team 4-6

- Top 5 Projects
- Top 5 Technical Interests
- Short Narratives
- Top 3 Project
- Students Surveyed
How are teams chosen?
Actions you could take **Before next Fall.**

- **Consider what you’d like to explore as a Project?**
- **Plan your project with a faculty, industry, or community members in advance.**
- **Setup an Appointment to discuss!**
  - Marzette.1
- **Submit a Project Idea Early**

https://go.osu.edu/maecapstonesurvey
Project Mix

SPR2023 PROJECTS
- [Schaeffler] Control Device for Solid State Battery Stack
- [MAE] Project Arusha Rover
- 😊 Adjustable Walking Band Brace
- Cookie Extruder
- Di-Wheel - Rolling Around (and Around)
- Solar Powered Drone Platform

AU2022 PROJECTS
- [HRST] Firing Duct Cool Vision Viewport Camera Addition
- [HONDA] Lightweight Clamp Rod and Clevis
- [HONDA] Lightweight Hybrid Clamp Arm
- [HONDA] Modular A Rack Packaging
- [MAE] In-Pipe Hydroturbine for Hydropower UV LEDs

Spr2022 Projects
- [MAE] Drone Propeller Efficiency: Test Stand Development
- 😊 Robotic Arm: Pick-Pull-Place

SPR2022 PROJECTS
- [MAE] ARUSHA Rover Medical Workstation
- 😊 Basketball Backboard Mounting Lift
- 😊 Motorcycle Swing Arm Front Suspension
- 😊 Skateboard Brakes
- 😊 Walking Locomotion in the Field of Soft Robotics
- Di-Wheel - Rolling Around (and Around) - Group 1
- Di-Wheel - Rolling Around (and Around) - Group 2
- Solar Powered Drone Platform
- Cookie Extruder
- Gravity Battery System

KEY
BOLD = COMMUNITY PARTNER
😊 = STUDENT PROPOSED
GRAY = CAPSTONE
Project Mix

AU2021 PROJECTS
- [DHL] Supply Chain Facilities Sustainability
- [HONDA] Engine Hanger Lift Design
- [HONDA] Modular Packaging Prototype
- [HRST] Series 5 Mechanical Pipe Seal
- [MAE] Multi-Mode Drone
- [MAE] Two Axis Inverted Pendulum
- [ZOO] Elephant Vending Machine

SPR2021 PROJECTS
- [HRST] Firing Duct Enhanced View Port Prototype Remote Viewing Enhancement
- [HONDA] Bumper Instrument Panel Fixture Design
- [HONDA] Water Intrusion Simulation
- [MES] Electric Vehicle Inverter Module Thermal Analysis

and Testing
- [MAE] Develop a Prototype 3D Printer
- Prosthetic Hand: Compact Joint Design
- Gravity Battery System
- Autonomous Competition Rack
- Gas Thruster Controlled Drone
- Personal Vehicle Integrated Entertainment Ride System
- Mini-Baja: Gearbox with Integrated Selected 4WD
- Plate and Ball Demonstration
- Multi-Mode Drone
- Fish Team
- Strandbeest
- Cable Driven Parallel Robotic Manipulator

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SPR2021 PROJECTS

- [HRST] Firing Duct Enhanced View Port Prototype Remote Viewing Enhancement
- [HONDA] Bumper Instrument Panel Fixture Design
- [HONDA] Water Intrusion Simulation
- [MES] Electric Vehicle Inverter Module Thermal Analysis and Testing
- [MAE] Develop a Prototype 3D Printer
- Gravity Battery System
- Autonomous Competition Rack
- Gas Thruster Controlled Drone
- Personal Vehicle Integrated Entertainment Ride System
- Mini-Baja: Gearbox with Integrated Selected 4WD
- Plate and Ball Demonstration
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AU2020 PROJECTS

- [HONDA] Die Casting Cooling System Analysis
- [CINCI ZOO] Iterate & Improve the display of the Elephant Vending Machine
- [HONDA] Instrument Panel Transport Cart Design
- [HONDA] Engine Hanger Lift Design
- [HONDA] Automated Grommet Loading Design
- [HRST] Series 5 Mechanical Pipe Seal Leakage Testing & Improvements
- [PRECEIN] Alertware Device
- [MAE] Kit Build a PCR: A Design Study
- 2021 ASME IAM3D Competition: Unmanned Aerial Racing Cargo Vehicle (UARCV)
- Granular Jamming Mechanical End Effector
- Two axis inverted pendulum
- Robotic Instrument - Reed Organ

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SPR2020 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

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Project Mix

AU2019 PROJECTS

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

• (**) Die Casting Cooling System Analysis
• (**) 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

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**

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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 😊