

Engineering Design Summer Institute – Syllabi/Schedules (Tentative)

Hours: 9a – 4p (subject to change)

Rockets:

Week 1

- Class Overview and Rocketry Intro
- OpenRocket Basics
- Flight Dynamics
- Print and Launch 3D Printed Rocket

Week 2

- Vehicle Engineering and Manufacturing
- Propulsion
- Electronics and Payload Design
- Preliminary Design Review

Week 3

- Finishing Group High Powered Rocket
- Road trip and Launch Offsite!
- Final Presentations

Planes

Week 1:

- Introduction to Physics of Flight
- Parts of a Plane
- Assemble Project Teams
- Complete Safety Training
- Introduction to Computer Aided Design with SolidWorks
- Introduction to Figure of Merit (FOM) Charts
- Airfoil Selection
- Plane Specific CAD
- Design of Motor/Landing Gear Mounts

Week 2:

- Hand Drawings of Plane
- Design Review
- Propulsion System Overview
- Design Reviews + Group Design Time
- Plane manufacturing and testing

Week 3:

- Tech Inspections, testing, and Propulsion System Install
- Test fly plane and iterate/modify design as needed
- Design Presentations
- Final flight

GoKarts:

Week 1

- CAD Basics and Practice
- Engineering Best Practices
- Group Formation
- CAD Chassis and Design Review
- CAD Drivetrain/Electronics and Design Review

Week 2

- CAD Brakes/Steering & Ergonomics and Design Review
- Manufacturing the Kart

Week 3

- Manufacturing the Kart
- Driving Kart and Revising Design
- Final Presentation
- Race!

Rovers:

Week 1

- Course Intro and Computer-aided design in Solidworks
- Arduino Programming Basics
- Assembly and Fabrication: Laser cutting demonstration
- CAD and Make Rover Chassis
- CAD Wheels + 3D Print
- Design motor mounts
- Write draft of rover code
- Radar Assignment
- Wiring the Arduino Uno, H-Bridges, battery, and servos

Week 2

- Soldering Workshop
- Assemble rover and test code
- First Project Demonstration
- Debrief and feedback
- Final Project Brief
- Sensor Integration: MPU 6050
- Preliminary Design Reviews

Week 3

- Programming in MATLAB
- Write mapping code
- Object Recognition and Retrieval
- Build and Test Rover on Course
- Final Competition and Presentations