

ENGR 1GK - Introduction to Engineering Design: Go Karts

Lecture: Monday-Friday 9am - 4:00 pm | Boelter Hall 1805

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 Engineering V 5121G

Tentative Course Schedule:

Day	Topic	Goals
Week 1		
1	Intro to Class and to Engineering <ul style="list-style-type: none"> - Syllabus review - Complete Pre-Class Survey - 2D Solidworks (CAD) Tutorial 	<ol style="list-style-type: none"> 1. Get to know the class and instructors 2. Gain familiarity with 2D sketching 3. Create the fastest rubber band car and race 4. Complete Lab Safety Training 5. Makerspace and SEASnet Lab Tour
2	CAD Tutorials + Subsystem Intro <ul style="list-style-type: none"> - 3D Solidworks (CAD) Tutorial - CAD Assemblies - Chassis Subsystem Introduction - Assemble into teams 	<ol style="list-style-type: none"> 1. Create 3D models from 2D sketches 2. Create assemblies from pre-made 3D models 3. Create shared Google Drive with teammates and instructors 4. Brainstorm team theme
3	Go-Karts Subsystem Deep Dive <ul style="list-style-type: none"> - Drivetrain Subsystem - Chassis Mini Design Review - Electronics Subsystem 	<ol style="list-style-type: none"> 1. Begin chassis assemblies in Solidworks 2. Implement chassis feedback 3. Brainstorm drivetrain subsystem
4	Go-Karts Subsystems + Manufacturing Tutorial <ul style="list-style-type: none"> - Vehicle Dynamics and Steering Subsystem - 3D Printing and Laser Cutting Tutorial - Ergonomics and Braking Subsystems - Kahoot 	<ol style="list-style-type: none"> 1. Brainstorm drivetrain and braking integration 2. Prepare Preliminary Design Review presentation 3. Understand the basics of using the Makerspace 3D printers and laser cutters
5	Preliminary Design Review + Chassis Deadline <ul style="list-style-type: none"> - Preliminary Design Review - Finalized chassis designs - Submit custom gusset .DXF files - Begin steering subsystem - Learn electronics wiring 	<ol style="list-style-type: none"> 1. Deliver Preliminary Design Review presentation to peers and instructors 2. Implement feedback into new chassis iteration 3. Submit final .DXF files to Google Form

Week 2		
6	Manufacturing Tutorials <ul style="list-style-type: none"> - Miter saw tutorial - Deburring and belt sanding tutorial - Drill press tutorial 	<ol style="list-style-type: none"> 1. Cut 80/20 tubes to desired length according to team's Solidwork top assembly 2. Debur excess metal from gussets or 80/20 3. Start assembling chassis with connectors and bolts
7	Motor Testing <ul style="list-style-type: none"> - Finite Element Analysis (FEA) Tutorial: Solidworks Simulation - Motor inspection 	<ol style="list-style-type: none"> 1. Learn how Finite Element Analysis (FEA) is used to simulate stress, strain, and deformation in parts. 2. Conduct FEA on go-karts 3. Check if motors are running on student go-karts
8	Brake Testing <ul style="list-style-type: none"> - Introduce team merchandise competition - Braking subsystem testing 	<ol style="list-style-type: none"> 1. Test acceleration and brake systems with weight 2. Use manufacturing skills and machines such as the 3D printer, vinyl cutter, and laser cutter to create the best team merchandise
9	Track Designing <ul style="list-style-type: none"> - Work on Critical Design Presentation - Drafting track 	<ol style="list-style-type: none"> 1. Design a well rounded track for race day, tailored to the strengths of your kart
10	Critical Design Review <ul style="list-style-type: none"> - Critical Design Review presentations - Mentor test drive - Work on team merchandise 	<ol style="list-style-type: none"> 1. Deliver a well justified design presentation using physics and/or simulation results 2. Mentors test drive go-kart
Week 3		
11	Test Driving <ul style="list-style-type: none"> - Begin mock course on kart - Work on Final Design Presentation 	<ol style="list-style-type: none"> 1. Continue to work on go-kart subsystems
12	Carbon Fiber Layups <ul style="list-style-type: none"> - Test run day - Strength of materials lecture - Carbon fiber safety lecture - Carbon fiber layup 	<ol style="list-style-type: none"> 1. Test go-kart to optimize and improve current designs 2. Analyze pre-made carbon fiber samples 3. Do a carbon fiber layup
13	Workday + Carbon Fiber Post Processing <ul style="list-style-type: none"> - Continue testing - Examine carbon fiber layups 	<ol style="list-style-type: none"> 1. Test drive go-kart and troubleshoot 2. Work on Final Design Review presentations 3. Post process carbon fiber

	and cut sheets	
14	Workday <ul style="list-style-type: none">- Continue testing- Instructor go-kart inspection- Work on Final Design Review presentation	<ol style="list-style-type: none">1. Test drive go-kart and continue to troubleshoot, if needed2. Complete Final Design Review presentations
15	Final Presentations and Race <ul style="list-style-type: none">- Present Final Design Review- Race go-karts- Present awards	<ol style="list-style-type: none">1. Present an optimized go kart design and explain the engineering process throughout the 3 weeks2. Race go-karts3. Awards ceremony4. Course evaluations

- Course attendance is *extremely important*.