Engineering 96G
Introduction to Engineering Design: Go-Karts
Summer 2023 Syllabus

Lectures: **Monday-Friday 9:00 am – 4:00pm Boelter Hall Makerspace 1805** **Stetson S./Suraj S.**

Instructor of Record: Prof. Jacob Schmidt, Ph.D., schmidt@seas.ucla.edu, Engineering V 5121G

Group Tutors:

Name: Stetson Schott
2nd year, Mechanical Engineering
Contact: stschott@ucla.edu
(415) 304-7943

Name: Suraj Shah
2nd year, Mechanical Engineering
Contact: surajnshah@ucla.edu
(626) 510-5099

Course Description: Welcome to UCLA and what may be your first engineering class! This course will be vastly different from your other courses as we will be exploring engineering through hands-on projects while learning to utilize many of the resources available in the Makerspace. This class will be led by undergraduate MAE students. This practical course aims to teach prospective engineers the thrill of a multi-discipline, end-to-end team-based engineering design. As with most large projects, they are broken into smaller cycles that will be solved independently, then integrated together. This project is constructed in such a way to optimize the student's time in each step of preliminary design, Computer Aided Design, Finite Element Analysis, machining, detailing electric motor performance, and finally presenting their ideal Go-Kart. Students have creative freedom in the following areas: driver posture, steering and braking mechanisms, chassis layout and driver interface system. Over the course of the project students will learn how to give technical presentations and learn fundamental engineering concepts. At the end of the course, teams will participate in a competition where they will give a design presentation and drive their vehicle through a timed track. The presentation will allow students to consider their design process and consider ways in which they can be more efficient. The kart race provides the source of system goals for their go karts. The program's design, build, test cycle will

mimic working in a real-life, collaborative industry environment. Mentors will define the big picture and assist in removing impediments to progress.

Course Communication: Announcements, lecture slides, assignments, and other course materials will be posted on the UCLA Bruin Learn course website. Students are responsible for checking the site often and ensuring that they read all mass e-mail announcements sent via the Bruin Learn website. A unified Discord server will also be created for the class. This will be used to coordinate between classmates and instructors and serve as a forum to facilitate questions and discussion.

Tentative Course Outline and Schedule:

Day	Topic	Goals
	Week 1	
1	***Course Intro and CAD*** - Introduce mentors and course - Computer-aided design in Solidworks (2D sketching and 3D modeling)	1. Design and create a steering wheel in Solidworks 2. Get familiar with sketching and 3D modeling in solidworks 3. Lab Safety Fundamentals Training
2	***Rubber Band Race Car*** - Rubber band race car activity ***CAD*** - Assemblies in Solidworks	1. Create a rubber band race car in groups 2. Design and create a foot pedal in Solidworks 3. Get familiar with assemblies in Solidworks
3	***Teams and Begin Design*** - Begin go-kart design in groups ***Chassis*** - Introduce chassis and begin designing your team's chassis ***Go-Kart Subsystems*** - Introduce all the different subsystems	1. Break out into teams and start design of go-kart 2. Design chassis of go-kart 3. Get feedback on chassis design and revise

	of the go-kart and a way to divide group work	
4	***Continue Design*** - Finalize chassis design and start thinking about other subsystems ***Steering*** - Learn the fundamentals of steering to create a smooth driving experience for your go-kart ***Drivetrain*** - Learn how to get your go-kart rolling efficiently ***3D Printing*** - Learn the fundamentals of 3D printing	1. Create CAD of chassis 2. Give cut lists for chassis to instructors 3. 3D printing demonstration 4. Start designing steering and drivetrain subsystems
5	***Safety Fundamentals*** - How to use tools in the makerspace safely ***Begin Manufacturing*** - Start manufacturing go-kart and how to use tools	1. Start building chassis 2. Start initial design review slides 3. Continue designing and CADing other aspects of go-kart 4. Give STLs to be printed
Week 2 (Holiday Monday)		
6	***Brakes and Ergonomics*** - Learn how to design cars ergonomically - Learn how brake systems work	1. Continue designing and CADing go-kart 2. Finish design review slides 3. Work on t-shirt designs
7	***Design Review*** - Students present their initial design to the class ***Manufacturing*** - Start manufacturing other subsystems of the go-kart	1. Present initial design slides to the class and receive feedback 2. Revise design of go-kart if necessary 3. Start work on building drivetrain or steering
8	***Work Day*** - Continue designing and manufacturing	1. Work on building the go-kart 2. Start final designs

	go-kart	
9	***Electronics*** - Learn how to supply power to the motors and create a speedometer ***Work Time*** - Continue designing and manufacturing go-kart	1. Work on building the go-kart 2. Start assembly of electronic components 3. Finish final design slides
Week 3		
10	***Final Design Presentations*** - Groups present their final design to the class	1. Students present their final design slides to the class and get feedback 2. Continue to build go-kart and make changes if necessary
11	***Work Day/Testing*** - Start testing go-kart to determine strength of design	1. Finish the steering, drivetrain and electronics of the go-kart 2. Test the go-kart 3. Fix go-kart if necessary 4. Add brake system or other subsystem parts
12	***Practice Race*** - Practice race to test go-kart and practice driving	1. Practice driving the course and test the go-kart 2. Make any changes if necessary 3. Start design portfolio slides
13	***Work Day*** - Continue to test and complete the go-kart	1. Test and fix go-kart 2. Add finishing touches 3. Finish design portfolio slides
14	***Final Presentations*** - Student groups recap what they did over the 3 weeks ***Race*** - Race the go-karts and give out awards	1. Present the design portfolio slides to the class 2. Race the go-karts 3. Awards ceremony 4. Course evaluations

Grading Policy:

- Since this is a 2 unit, letter graded course, much of what you get out of this course depends on the amount of work you put in. It's early in your engineering studies/career, so we understand that go-karts may end up not being something you are passionate about. However, there is a minimum standard that all students will be held to. Requirements are reflected in the grading scheme and include the following: attendance and active participation at every class session, active participation in your project groups, completion of smaller assignments, and participation in group project presentations.

Course Point Opportunities

- **Class Attendance**
  - 2 points per day, 1 for morning and 1 for afternoon
  - 1 point per day for participation
- **Videos, Tasks, Assignments**
  - Points will be assigned on bruinlearn
- **Design Reviews and Final Project**
  - Worth 10 points, Final is 25
  - Bonus Points = up to +15

Letter Grade Rubric (%)

A+:	**≥ 100**
A:	**≥ 90 and < 100**
B:	**≥ 80 and < 90**
C:	**≥ 70 and < 80**
D:	**≥ 60 and < 70**
F:	**< 60**

- Course attendance is extremely important. If you need to miss a class, please contact an instructor at least 3 days in advance. Excused absences will be given to those with acceptable excuses.
- If you are concerned about your level of participation in the class and whether this may result in a failing grade, please approach any of the instructors and talk about it before dropping the course. We understand it can be a difficult transition to a college level class and want to be able to support you. Please do not wait until the last minute to bring up any concerns.

Academic Integrity:

- UCLA expects and requires all of its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments and projects.

- Working in groups is allowed and encouraged. However, submitting the work of others, cheating, and plagiarism are unacceptable. The key to working in an effective group is compiling input from all members and making equal contributions.
- In accordance with UCLA policy, any cases of suspected cheating or academic dishonesty will be reported to the Dean of Students Office and the Department of Student Affairs. Sanctions may include zero credit on an assignment or a no-pass. If warranted, a student may be disqualified, suspended, or expelled from the School of Engineering. It is your responsibility to know and understand the University Academic Integrity Policy and the UCLA Student Code of Conduct (http://www.deanofstudents.ucla.edu/).

Additional Information:

- Counseling and Psychological Services (CAPS) exists to support your mental health needs as you pursue your academic goals. CAPS services are designed to foster the development of healthy well-being necessary for success in a complex environment. A variety of services are available including: crisis counseling by phone 24/7, emergency intervention, Individual counseling and psychotherapy, group therapy, psychiatric evaluation and treatment, educational programs and workshops, campus mental health and wellness promotion. Visit https://www.counseling.ucla.edu/ for more information or call 310-825-0768. For emergencies, please contact 911.
- Students requesting accommodations for a disability, including additional time or resources for taking exams, must be registered with the UCLA Center for Accessible Education (CAE; http://www.cae.ucla.edu/) and must submit appropriate documentation from the CAE.
- Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender-Based Violence, 1st Floor Wooden Center West, CAREadvocate@caps.ucla.edu, (310) 206-2465. In addition, Counseling and Psychological Services (CAPS) provides confidential counseling to all students and can be reached 24/7 at (310) 825-0768. You can also report sexual violence or sexual harassment

directly to the University's Title IX Coordinator, 2241 Murphy Hall, titleix@conet.ucla.edu, (310) 206-3417. Reports to law enforcement can be made to UCPD at (310) 825-1491.

- Faculty and Group Tutors are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX Coordinator should they become aware that you or any other student has experienced sexual violence or sexual harassment.

Feedback/Suggestions:

We take feedback and suggestions very seriously in this course. Since this is a new class, we are always looking for ways to make it better--more educational, engaging, and exciting. Please feel free during any time to use the following form to anonymously submit course feedback. It will be checked regularly. In addition, we will be sending out a more formal mid-course evaluation form around Day 8 (Wednesday of Week 2) and a final course evaluation form on the last day of class.