

## RISE - Rocket Introduction for Student Education

### Summer 2023 Syllabus

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Monday-Friday 9:00 - 16:00

Location: Engineering IV ("E4"), room 14-118 or Lot 7

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**Instructor of Record:** Prof. Jacob Schmidt, Ph.D., [schmidt@seas.ucla.edu](mailto:schmidt@seas.ucla.edu)

#### Instructors:

<b>Name</b>	Danny Velasquez 4th year, Aerospace Engineering B.S.	Nikhil Seshadri 2nd year, Aerospace Engineering B.S.
<b>Contact</b>	<a href="mailto:dannyav@g.ucla.edu">dannyav@g.ucla.edu</a> (213) 291-4468 Discord: @Buckaroo	<a href="mailto:capgreenbruin@g.ucla.edu">capgreenbruin@g.ucla.edu</a> (408) 406-7470 Discord: @theflattestnacelle
<b>Office Hours</b>	TBD	TBD

*Office hours will be held either on Zoom, in the Rocket Lab (E4 14-118), or in the Makerspace (1805 Boelter Hall); location and time is subject to change with notice.*

## Course Description

Welcome to UCLA and what may be your first engineering class! This course will be vastly different from your other classes as we will be exploring engineering through design projects while learning about direct applications to one of UCLA's Student Engineering Clubs, Rocket Project at UCLA. This class will be led by undergraduate MAE students and Active Rocket Project Members who have experienced many of the things you may be looking forward to during your time at UCLA.

This course is meant to introduce high school students to the world of rocketry through a team-based prototyping and real-world testing process. Students will learn the fundamentals of engineering design and communication, utilize Computer-Aided-Design (CAD) tools like SolidWorks, and apply it to rocket-design using OpenRocket. They will take these designs and build rockets through composite-material layups, 3D printing, laser-cutting, and more manufacturing techniques in teams. Students will also learn electronics and sensor-programming in Arduino for the purpose of flight data-analysis on their rockets. Finally, they will learn how the projects and knowledge acquired in this class apply to the aerospace industry through physics-based Rocket Deep-Dive presentations. Students will have multiple prototyping workshops and launch opportunities. The course will culminate in a final project rocket that will launch several thousand-feet high and be launched at the Santa Fe Dam Recreational Area or the Mojave Desert, TBA.

## Course Communication

The primary modes of communication for this class will be [Bruin Learn](#) and [Discord](#). These will be used to coordinate between classmates and instructors and as forums to facilitate questions and discussion. Additionally, announcements, lecture slides, assignments, and other course materials will be posted on the UCLA Canvas course website. Students are responsible for checking the site often and ensuring that they receive announcements sent via BruinLean and Discord.

## Course Outline and Schedule

(Subject to change)

Week	Topic	Assignments and Videos
1	<b><i>Egg Drops, Engineering and Rocketry Fundamentals, 3DPR #1</i></b> <ul style="list-style-type: none"> <li>- Get excited about rockets and the space industry!</li> <li>- Introduce overall class structure + lab tour</li> <li>- Egg Drops for team-building and design practice</li> <li>- Barometer Sensor Electronics + Arduino Intro</li> <li>- Fundamentals of rocket design in SolidWorks and OpenRocket with practice projects</li> <li>- Physics-fundamentals lessons</li> <li>- Rocket Deep-Dive: Propulsion</li> <li>- Design and launch first 3D-Printed Rocket (3DPR)</li> </ul>	<b>Tasks</b> <ul style="list-style-type: none"> <li>- Download software (OpenRocket, Arduino IDE, SolidWorks - optional)</li> <li>- Join Discord</li> <li>- Form partners for egg-drops and 3DPR #1</li> </ul> <b>Assignment Submissions</b> <ul style="list-style-type: none"> <li>- Arduino Intro + Data-Logger Code</li> <li>- Egg Drop Design/Analysis Presentation</li> <li>- OpenRocket Practice Problems</li> <li>- SolidWorks Practice Problems</li> <li>- Physics Practice Problems</li> <li>- 3DPR #1 OpenRocket and CAD files</li> </ul> <b>Videos</b>
2	<b><i>3DPR #2, Manufacturing Techniques, Final GHPR Design</i></b> <ul style="list-style-type: none"> <li>- Rocket Deep-Dive: Aerodynamics</li> <li>- Design 3DPR #2, incorporate sensors</li> <li>- Manufacturing Techniques Intro</li> <li>- Rocket Deep-Dive: Structures and Recovery</li> <li>- Design and CAD final project: Group High-Powered Rocket (GHPR)</li> </ul>	<b>Tasks</b> <ul style="list-style-type: none"> <li>- Form new groups of 4 for 3DPR #2 and GHPR</li> </ul> <b>Assignment Submissions</b> <ul style="list-style-type: none"> <li>- 3DPR #2 OpenRocket and CAD files</li> <li>- Manufacturing Practice Objects</li> <li>- GHPR Ideation Doc, OpenRocket, and CAD files</li> </ul> <b>Videos</b>
3	<b><i>More Sensor Stuff, Motor Static-Fire, GHPR Manufacturing and Launch</i></b> <ul style="list-style-type: none"> <li>- GHPR Final Design Changes + Manufacturing</li> <li>- Accelerometer/Gyro Sensors + Arduino</li> <li>- G-Class Rocket Motor Static-Fire + Load-Cells</li> <li>- GHPR Launch, Data-Analysis, and Final Presentation</li> <li>- PARTY TIME!</li> </ul>	<b>Tasks</b> <ul style="list-style-type: none"> <li>- Wrap up GHPR Manufacturing</li> </ul> <b>Assignment Submissions</b> <ul style="list-style-type: none"> <li>- GHPR Manufacturing Progress</li> <li>- Accelerometer/Gyro Data-Logger Arduino Code</li> <li>- Load-Cell Static Fire Data</li> <li>- GHPR Final Presentation</li> </ul> <b>Videos</b>

## Grading Policy

- Since this is a 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 rockets 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 participation at 90% of your section's meetings, active participation in your project groups, completion of assignments, and participation in group-project presentations.
- This class is designed with the goal of keeping you interested, having fun, and learning safe rocket engineering practices. However, evaluation of student participation is necessary for our records which ensure a thorough understanding and safe practices by ALL members, especially upon recent return to the lab environment.

### Course Point Opportunities (final grade is out of 100 points):

1. **Enrollment** +90 points
2. **Class Attendance** +5 points
  - a. Each Unexcused Absence: -5 points
  - b. (please message your instructors at **least 1-day** in advance to excuse an absence; there will be no penalty for this)
3. **Videos, Tasks, Assignments (excluding main projects)** +5 points
  - a. Each Unattempted = -5 points
4. **3DPR and GHPR Project**
  - a. Each Incomplete = -10 points
  - b. Bonus Points = up to +15 points
  - c. **MUST** complete both of these assignments in order to pass the class

- Overall, this should be casual, fun, and not a source of stress in your life. If you are concerned about your level of participation in the class and whether this may result in a failure to meet passing standards, please approach any of the instructors and talk about it. We understand it can be a difficult transition to college and want to be able to support you, especially given the current circumstances. Please *do not wait* until the last minute to bring up any concerns.

### Optional Reading (on Google Drive as PDFs):

- Sutton, George P. *Rocket Propulsion Elements*. Wiley, 2016. (ISBN-13: 78-1118753651)
- Huzel, Dieter K. and Huang, David H. *Modern Engineering for Design of Liquid-Propellant Rocket Engines*. American Institute of Aeronautics & Astronautics, 1992. (ISBN-13: 978-1563470134)
- Stine, Harry G. and Stine, Bill. *Handbook of Model Rocketry (NAR Official Handbook)*. Wiley, 2004. (ISBN-13: 978-0471472421)

## University of California, Los Angeles Policies

### 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](mailto: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](mailto:titleix@conet.ucla.edu), (310) 206-3417. Reports to law enforcement can be made to UCPD at (310) 825-1491.

Engineering Design Summer Institute: Rockets

Summer 2023, Syllabus

- 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.
- This Group Tutors of this course acknowledge the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (the Los Angeles basin and So. Channel Islands). As a land grant institution, we pay our respects to the Honuukvetam (Ancestors), 'Ahihirom (Elders), and 'Eyoohiinkem (our relatives/relations) past, present, and emerging.

## 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 periodically. In addition, we will be sending out a more formal mid-course evaluation form around Week 5 and a final course evaluation form after Week 10.

<https://forms.gle/HmrqG4KFvjnedinS6>