Teaching Track Record

I am on my way to establishing the first ABET-accredited aerospace engineering program in the state of Hawaii. I helped establish the Hawaii Institute of Geophysics and Planetology's Earth and Planetary Exploration Technologies (EPET) Certificate and the Department of Mechanical Engineering's Aerospace Engineering Concentration, which has been growing since January 2021. I am currently in the process of converting the EPET certificate into a minor so that students with financial aid can have EPET courses covered in their aid:

- EPET/ME 301: Space Science and Instrumentation (co-taught 5% every fall, 4 credits, every fall since 2021)
- EPET/ME 400: Spacecraft Mission Design (sole instructor, 4 credits every spring since 2021)
- EPET/ME 401: Capstone Project: Producing a Science Satellite (co-taught 30% in fall of 2022 4 credits)
- In the spring of 2022, I assisted an engineer in administering a spacecraft design course to teachers through the outreach college through ME/Electrical Engineering (EE)/ Earth Science (ERTH) 699.

I've taught two graduate seminar courses to explore advanced topics related to machine learning in dynamic system applications by reading and presenting on state-of-the-art literature in this field. I preselected a body of literature for the students to choose from and I would lecture the first lecture on basic background for this field. Every subsequent week, a student would form the baseline presentation material to explain the main concepts of the paper while fielding questions from the other students. I step in to answer any questions the presenter could not answer or did not answer correctly. Information and Computer Science (ICS) 699 and ME 696 doubly serve as my efforts to promote the NSF AI Institute for Dynamic Systems by growing UH's capabilities in machine learning:

- ICS 699: Machine Learning Seminar (co-taught 40% in spring 2022, 2 credits)
- ME 696: Machine Learning for Dynamics Systems (sole instructor, 2-3 credits in fall 2023)

Students work with me on the undergraduate rover project team for Vertically Integrated Project (VIP) and Senior Capstone Design Project course credits, which allows for students from interdisciplinary backgrounds to get credit for learning through an engineering project experience. I host professional development sessions, like "resume roasts" before career fair and women in STEM mentoring sessions. The course credits associated with advising engineering students (ENGR, EE, ME, ICS) feed into my research pipeline. The VIP Team RoSE students that included 40 members in 2021- 2022 and 36 students in 2022-2023 receive credit for their efforts in building a rover that conducts science and technology demonstrations, receive supervisory and peer mentoring by immersing themselves in a year of an engineering design cycle. I recruit the most capable undergraduates from this project team to do research with me and the rover that the whole team builds support research projects and proposals.

- I also have many course numbers associated with advising students in engineering (ENGR) and the sciences: ENGR/EE 196, ENGR/EE 296, ENGR/EE 396, ERTH 399, EE/ICS 496, ME 499, ERTH 499, ME/EE/ERTH 699, ME/EE/ERTH 700, and ME/EE/ERTH 800

Figure 1: VIP Team RoSE Spring 2023

My course ratings are summarized in my own collation of ratings across all courses across time, which show I consistently receive ratings above 4.4/5 every semester [Fig. 2]. I've been nominated an award in teaching every single year I've been teaching despite my few years of experience teaching at the professor level. Multiple students list me as their favorite professor or the class as their favorite course at UH after at least 3 years at UH.

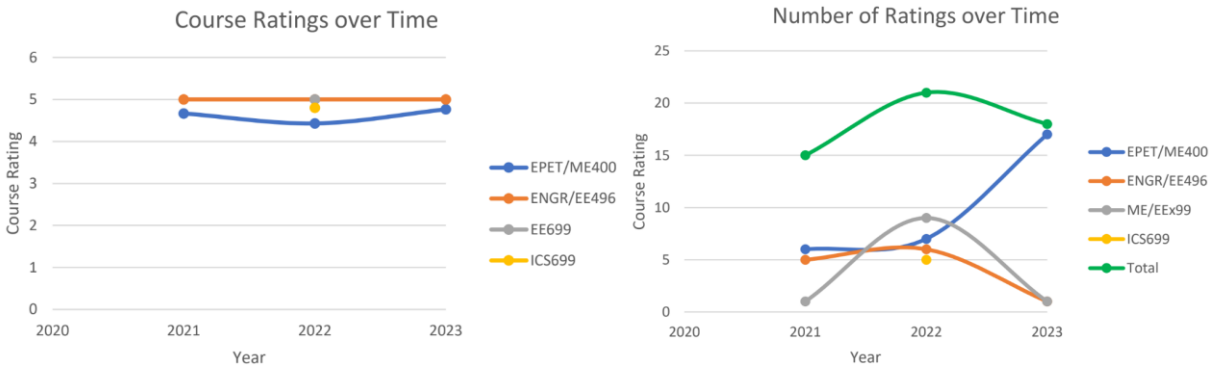

Figure 2: left, course ratings over time for various courses. right, number of ratings over time for various courses

Teaching Philosophy: a Case Study of My Spacecraft Mission Design Course

Our students are entering a world in which building spacecraft is an attainable skill with a bachelor's degree and our curriculum must ready them for this reality. I advocate for active learning in the classroom through discussion and collaboration, surpassing the passive nature of large lectures. In my smaller classes, I employ Bloom's taxonomy, engaging students from foundational knowledge to creative application, ensuring clarity through interactive methods and tools [Fig. 3]. The Spacecraft Mission Design course I developed epitomizes this approach. Here, students take a space mission from concept to construction, integrating hands-on methods and custom technology like satellite kits from our university and a digital textbook I authored. This course, featuring in-classroom innovation and online resources, has attracted attention globally, with one UH team winning a NASA CubeSat Launch Initiative award.

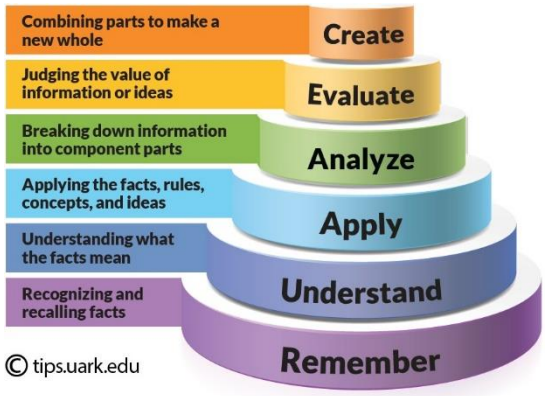

Figure 3: Bloom's Taxonomy. University of Arkansas

I authored an open-source textbook, "A Guide to CubeSat Mission and Bus Design," which serves both my class and the global community, complete with software and hardware labs across 7 of its 11 chapters [Fig. 4]. Over 4,000 readers engage with it monthly, and it has received acclaim from academics and professionals worldwide. Lectures, while concise, have been adapted to be absorbed at students' own pace, supplemented by online quizzes and interactive annotations. My publicly shared Google Drive with course materials allows anyone

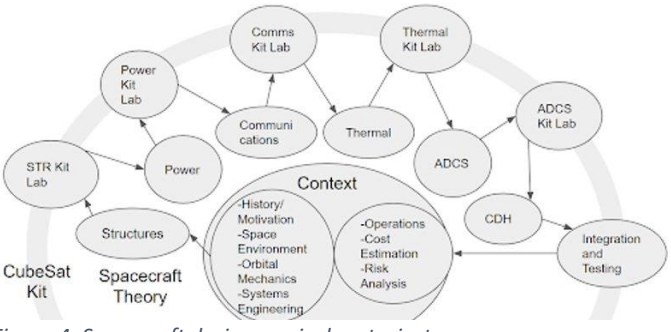

Figure 4: Spacecraft design curriculum trajectory

to venture into small satellite design. Real-world problems and a semester project, like a Critical Design Review, build and test students' understanding incrementally.

In class, active engagement and tailored team discussions lead to a deeper understanding, while the labs bring the practicality of spacecraft V&V testing to students [Fig. 5], previously hindered by cost and complexity. The course demands a synthesis of disciplines, preparing students for real-world communication and problem-solving in spacecraft design.

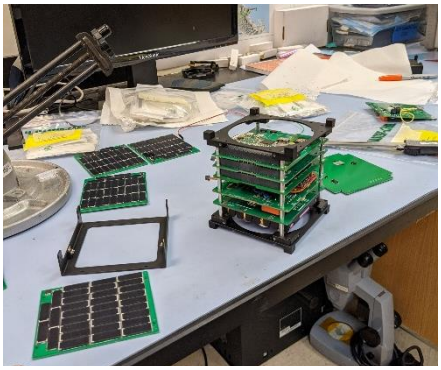

Figure 5: CubeSat kit that accompanies course

The course finale is an integrated project presentation, where students communicate complex designs, learning from both successes and failures. Over the years, I've taught numerous students (approximately 50 in formal classes and over 100 informally through project teams), fostering a mindset of resilience and innovation. While education is the primary goal, producing functional spacecraft is a practical and natural extension of the curriculum. I'd love to collaborate with Profs. Anderson, Delson, and Sadeghizadeh in aerospace education pedagogy.

Courses I Can Offer

- Spacecraft Design and Mission Architecture
- Machine Learning in Dynamic Systems
- System Dynamics
- Stochastic Estimation and Control
- Multivariable Control Theory
- Space Systems Attitude Determination and Control
- Foundations of Machine Learning
- Foundations of Robotics
- Differential Equations for Engineers
- Linear Algebra for Engineers

Mentorship and Advising Track Record

Training students fulfills the same desire of what I imagine raising children would be: joy, pride, and legacy. I take immense pride in the success of my students, both in the classroom as an instructor / teacher and outside the classroom as a mentor / advisor. This bottomless passion and efficacy show in my program creation, my course reviews, my relationships with my students, and my student's career offers after graduation.

I have expended great effort in developing my research lab, the Robotic Space Exploration (RoSE) Laboratory. My current lab members, who I define as engineers and academics I fund and directly advise on at least a biweekly basis, total 16 people: 2 engineers, 1 postdoctoral scholar, 3 PhD students, 6 Master's students, and 4 undergraduate students. I have graduated and funded 1 Master's student, 5 undergraduate students, and 1 post-bac turned engineer. In addition to mentoring this group, I am also a member of 5 other graduate student committees. My lab houses at least 4 temporary undergraduate and high school interns every summer since 2021.

The students I have directly mentored through the VIP or project design courses have accepted post-degree offers from the following prestigious institutions: NASA JPL, Raytheon, University of Michigan (Ph.D.), Northwestern (Ph.D.), Nalu Scientific, OceanIt, Pearl Harbor, Boeing, Northrop Grumman, TU Delft (Master's), and Astrobotic. Most of these institutions are powerhouses in aerospace engineering and I am incredibly proud of all my students. I've written 22 letters of recommendation for students. They are kind enough to attribute their success to working with me.