

Lighter Than Air Autonomy Syllabus

VIP 2601/2602/3601/3602/4601/4602

Tuesday, 3:30pm-4:20pm, Van Leer 140

Instructor Information

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General Course Information

Description

This interdisciplinary, project-based course challenges students to analyze, design, and develop new hardware and software approaches to lighter-than-air autonomy. Students will work in teams that are organized around the subsystems of (1) electrical design, (2) mechanical design, (3) vision, and (4) software. The end goal of these efforts is to enable our autonomous vehicles to fly more efficiently, with more agility, and with more reliable catching and scoring.

Pre- &/or Co-Requisites

There are no pre-requisites or co-requisites for this course. All that is needed is a desire to learn and a willingness to work hard.

Course Goals and Learning Outcomes

By the end of this course sequence, students will be able to:

1. Design hardware or software that contributes to lighter-than-air autonomy and justify the design choices they have made.
2. Implement their design under constraints on size, weight, and power.
3. Integrate their designs using components including sensors/cameras, embedded systems, ROS2, and/or wireless communications to allow an autonomous vehicle to fly.
4. Understand and engage in team-driven development, including both the integration of different system components, as well as challenges in having hard constraints on size, weight, and power.

Course Requirements & Grading

VIP teams function like real-world project teams. Members work on different aspects of a shared project, ranging from sophomores to graduate students, and from first-time participants to those with multiple semesters of experience. Students may enroll for variable credit hours, which are considered in grading.

Grading Overview

Each student is evaluated across three core areas, with three mandatory requirements. Regardless of role or experience, students must demonstrate achievement in all three areas:

1. **Documentation and Records (33%)**
 - Maintain individual documentation.
 - Contribute to team documentation.

2. Personal Contributions (33%)

- Complete assigned writeups and demonstrations.
- Engage actively in the project.
- Contribute to technical progress.

3. Teamwork and Interaction (33%)

- Participate in peer evaluations. Failure to submit results in a full letter grade deduction.
- Attend meetings on time.
- Collaborate toward team goals.
- Coordinate and assist teammates.

Assignments

1. Every Friday by 5pm: Send me 3-5 bullet points describing what you have done over the past week and what you will work on next.
2. Written assignments and requests for demos will be assigned as needed throughout the semester.
3. Your final deliverable this semester is documentation of everything you have designed and/or built, along with what worked or didn't work, and what you would/will do in the future.

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Course Materials

Course Website and Other Classroom Management Tools

We use Slack extensively to coordinate our activities.

Course Policies, Expectations, & Guidelines

VIP is a collaborative, multidisciplinary, project-based learning and research experience. Your success in this course depends not only on your technical contributions but also on your active engagement with your team and the broader learning process.

Your Role in the Learning Process

As a VIP student, you are expected to:

- Take initiative in exploring and applying knowledge relevant to your project.
- Collaborate effectively with team members across disciplines and experience levels.
- Document your work thoroughly.
- Reflect on your learning and contributions throughout the semester.

This course is a real-world team environment, where learning is dynamic, self-directed, and collaborative. Your growth depends on your willingness to engage, contribute, and learn from others.