AUTONOMOUS SPORTS
TOPICS IN INTELLIGENT SYSTEMS ENGINEERING
ENGR-E 399/599
Sections: 11830 & 11831

Instructor:	Dr. Or Dantsker
	Department of Intelligent Systems Engineering
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Grader:	Caeden Taylor
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Website:	http://canvas.iu.edu
Class Time:	Mondays at 5:30PM–7:50 PM
Location:	Luddy Hall 4010 Fab Lab – in person
	(unless otherwise noted in Course Schedule)

COURSE DESCRIPTION

In this hands-on class, students will develop autonomous lighter-than-air vehicle vehicles (i.e., autonomous blimps) to compete in the inter-university "Defend the Republic" (DTR) competition. During the competition, students aim to use their blimps to autonomously capture helium balloons and score them into the opponent's goals—effectively Robotic Quidditch. The challenge involves designing and controlling robot swarms that operate in challenging environments with limited sensing, actuation, and computation capabilities. Students will work in teams, performing vehicle design, fabrication, prototyping, embedded development, systems engineering, feedback control, motion planning, and computer vision.

REQUIRED MATERIALS

- There is no required textbook; all course reference materials are supplied in-class.
- No software purchases are required, the course uses free open source software (e.g. Arduino IDE, Python, Roboflow, GitHub, etc).
- Students are expected to supply a personal working laptop computer with permissions to install and use course software.

TEAMS

The majority of the coursework will be team-based and some will be individual-based (see grading below). Through the first homework assignment, students will be surveyed about their background and interests. The course staff will then assign students into teams (e.g. vehicle development, sensing and control, computer vision, etc.) Teams are expected to collaborate on the final course vehicle that will be used in the DTR competition. Please note in the grading structure that part of the course grade is drawn from peer evaluation.

If any issues arise, please email me, the TA, and grader (odantske@iu.edu, ameighan@iu.edu, caedtayl@iu.edu) as soon as possible.

GRADING COMPONENTS

The following evaluation breakdown will be used to determine your final grade in the course:

Evaluation Method	Percentage	
Section:	E399	E599

Homework submissions *(individual)*
    Systems Engineering Lecture Summary
    Rule Book & Research Assignment
    Lessons Learned & Reflections
	30% (3 × 10%)	18% (3 × 6%)

Weekly Status Memos *(individual)*	30% (12 × 2.5%)	
Project Effort *(individual)*	10%	
Team Deliverables *(group)*	20%	
Peer Evaluation	10%	
Grad Term Paper *(for 599 students only)*	-	12%
Total	100%	

See the end of this document for the Course Schedule for all of the deadlines.

GRADING STANDARDS

I will grade your work according to my expertise in the field, and your adherence to the instructions for each assignment. If you believe that you should have earned a higher grade than what you received, you can appeal. Send me an email outlining exactly what you think you should have received and why. Your appeal should provide evidence to support your case. To be considered, appeals must be received within two weeks of the time the grade is posted on Canvas.

Your final letter grade will be based on the following cutoff points. There will be no rounding up.

A+	98% and above
A	93 – 97.9%
A-	90 – 92.9%
B+	87 – 89.9%
B	83 – 86.9%
B-	80 – 82.9%
C+	77 – 79.9%
C	73 – 76.9%
C-	70 – 72.9%
D+	67 – 69.9%
D	63 – 66.9%
D-	60 – 62.9%
F	under 60%

LATE ASSIGNMENTS

Late assignment will not be accepted without prior approval or proper documentation. If an assignment is submitted after the deadline, it will receive a score of 0%.

STATEMENT ON ACADEMIC MISCONDUCT

Students will be expected to uphold and maintain academic and professional honesty and integrity as outlined in the IU Code of Student Rights, Responsibilities, and Conduct (https://studentcode.iu.edu/). Cases of academic misconduct will be handled according to the student disciplinary procedures described in IU's policies. The consequences for cheating are severe.

TURNITIN NOTICE

"Students agree that by taking this course all required written assignments may be subject to submission for textual similarity review to Tunitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site."

RELIGIOUS OBSERVANCE

In keeping with university policy, accommodations will be made for observance of religious holidays. Students are required to email the instructor to request accommodations at least 2 weeks in advance of the anticipated accommodation date. For more information on the policy on accommodations for religious observances, please see: https://vpfaa.indiana.edu/policies/bl-aca-h10-religious-observances/index.html#reasonForPolicy.

DISABILITY SERVICES FOR STUDENTS

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among others, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services for Students (http://studentaffairs.indiana.edu/disability-services-students/index.shtml) for information on arranging for accommodations. I cannot provide any accommodations without documentation from Disability Services for Students, and thus students in need of accommodations are highly recommended to contact the Disability Services early.

TITLE IX AND PREVENTING SEXUAL MISCONDUCT

As your instructor, one of our responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with the IU Sexual Assault Crisis Service (SACS) at 812-855-8900, Counseling and Psychological Services (CAPS) at 812-855-5711, or contact a Confidential Victim Advocate (CVA) at 812-856-2469 or osvpva@indiana.edu.

More information about available resources can be found here: http://stopsexualviolence.iu.edu/help/index.html

It is also important that you know that the University policy require me to share with the campus Deputy Title IX Coordinator or IU's Title IX Coordinator certain information brought to my attention about potential sexual misconduct. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been harmed. Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist.

ANSWERS TO QUESTIONS AND DISCUSSION OF PROBLEMS

If you have any questions about the course, assignments, lab work, or any other course-related matter, please feel free to contact me via email (odantske@iu.edu). In particular, if you think you might have a problem meeting an assignment deadline, you must send an email to explore options before the deadline. In addition, if you have any questions about your grade or would like to discuss other aspects of the course requirements, please contact me.

COURSE SCHEDULE

Note: This is a general guide; the exact schedule is likely to change over time. All deadlines are in U.S. Eastern Time Zone (ET).

Week	Date	Class Session	Assignments
1	Aug. 25	*Introduction Lecture*	Watch Video Lecture: Systems Engineering by Dr. Adam Ragheb from Blue Origin (on Canvas) Individual Homework 1 – Video Lecture Summary Due date: Aug. 31, 11:59 PM ET via Canvas
2	Sep. 1	**LABOR DAY** - *No Class*	Individual Homework 2 – Rule Book & Research Assignment Due date: Sep. 8, 5:00 PM ET via Canvas Grad Term Paper Proposal (E599 only) Due date: Sep. 7, 11:59 PM ET via Canvas
3	Sep. 8	*Discussion:* Rule Book, team assignments, LTA vehicle development, and group materials requests *In-Class Development Time*	Individual Weekly Status Memo 1 Due date: Sep. 8, 11:59 PM ET via Canvas Team Material Request Spreadsheet (1 per group) Due date: Sep. 12, 9:00 AM ET via Email to Instructors
4	Sep. 15	*Meetings with Instructors* (10-15 min per team) *In-Class Development Time*	Individual Weekly Status Memo 2 Due date: Sep. 15, 11:59 PM ET via Canvas
5	Sep. 22	*Team Presentation & Demo* (20-25 min team presentations to class – ungraded) *In-Class Development Time*	Individual Weekly Status Memo 3 Due date: Sep. 22, 11:59 PM ET via Canvas

6	Sep. 29	*Meetings with Instructors* (10-15 min per team) *In-Class Development Time*	Individual Weekly Status Memo 4 Due date: Sep. 29, 11:59 PM ET via Canvas Mid-Semester Peer Evaluation (shared with teammates) Due date: Oct. 6, 5:00 PM ET via Canvas
7	Oct. 6	*Meetings with Instructors* (15-20 min per team – including discussion of mid-semester peer evaluations) *In-Class Development Time*	Individual Weekly Status Memo 5 Due date: Oct. 6, 11:59 PM ET via Canvas
8	Oct. 13	*Team Presentation & Demo* (20-25 min team presentations to class – graded) *In-Class Development Time*	Individual Weekly Status Memo 6 Due date: Oct. 13, 11:59 PM ET via Canvas
9	Oct. 20	*Meetings* with Instructors (10-15 min per team) *In-Class Development Time*	Individual Weekly Status Memo 7 Due date: Oct. 20, 11:59 PM ET via Canvas
10	Oct. 27	*Meetings* with Instructors (10-15 min per team) *In-Class Development Time*	Individual Weekly Status Memo 8 Due date: Oct. 27, 11:59 PM ET via Canvas
11	Nov. 3	*Team Presentation & Demo* (20-25 min team presentations to class – graded) *In-Class Development Time*	Individual Weekly Status Memo 9 Due date: Nov. 3, 11:59 PM ET via Canvas
12	Nov. 10	*In-Class Development Time*	Individual Weekly Status Memo 10 Due date: Nov. 10, 11:59 PM ET via Canvas
13	Nov. 17	**Defend the Republic Competition** *Location & Date TBD* *(Optional if not at IU)*	Individual Weekly Status Memo 11 Due date: Nov. 17, 11:59 PM ET via Canvas
	Nov. 24	**FALL BREAK**	

14	Dec. 1	*Discussion:* Post-Competition Debrief *In-Class Clean Up*	Individual Weekly Status Memo 12 Due date: Dec. 1, 11:59 PM ET via Canvas Individual Homework 3 – Lessons Learned & Reflections Assignment w/ Final Peer Evaluations Due date: Dec. 8, 5:00 PM ET via Canvas
15	Dec. 8	*Discussion:* Lessons Learned & Reflections	Grad Term Paper Due date: Dec 12, 11:59 PM ET via Canvas
16	Dec. 15	**FINALS WEEK**	