

AE 202
Aerospace Flight Mechanics
Fall 2024
Syllabus Ver. 5.0

- Course Description: Fundamental principles of aerospace flight mechanics applied to spacecraft and aircraft. Orbital mechanics, rocket propulsion, and dynamics and control applied to spacecraft design. Aerodynamics, maneuvering, stability, and flight performance applied to aircraft design. Human centered engineering design process fundamentals incorporated throughout.
- Course Objectives: To build on classical physical mechanics and calculus and develop methods for predicting aerospace flight vehicle motion, forces, and performance. This is paired with aerospace flight vehicle design fundamentals, aerospace industry conventions, and human-centered design principles to create a baseline in aircraft and spacecraft flight mechanics to prepare the learners for upper-level aerospace engineering curriculum.
- Course Meeting: TR 2:00-3:20 PM (Section A) CST (UTC-6)
Classroom: Everitt 2233
Siebel Center for Design Classroom: TBD, dates announced in-class.
- Instructor: Dr. Elle Wroblewski (“El-lee” “Ro-bleh-ski” or “Vroo-blev-ski” if you’re feeling fancy)
wroblew3@illinois.edu
Ph.D. Aerospace Engineering 2022
M.S. Aerospace Engineering 2016
B.S. Aerospace Engineering 2014
- my gender is **nonbinary**
my pronouns are **they/them/theirs**
my professional/personal address is **Doctor (Dr) or Professor (Prof)**
please do not use these forms of address refer to me:
Mr., Ms., Mrs., Ma’am, Miss, or “the lady”
- Questions: Speak to me before class (10 minutes free), during question portions of class (beginning, end), or after class(30 minutes free).
Do not message me through Canvas.
Use the slack to contact me:
https://join.slack.com/t/professorwroblewski/shared_invite/zt-2001mnpia-rvWsRQITX16YiRD_zcFbEQ
- Office Hours: ON SLACK, TWR, 10:15 AM – 11:45 AM
You can request a zoom meeting with me if you cannot make it to office hours, this is subject to my availability during business hours.
- Teaching Assistants: Himmat Panang (hpanag2@illinois.edu)
- Prerequisites: TAM 212 Concurrent > TAM 210/211 > PHYS 211, MATH 241, MATH 257
- Credit: 3 Credit Hours

- Course Website: Canvas
- Textbook: There is no required textbook. You are allowed to create two pages of cram notes for the final exam. It is easier to create these notes and do well on the final exam if you take notes on the slides throughout the semester, but we will not grade, check, or require you to take notes.
- Attendance: Mandatory to collect printed worksheets, which will not be posted on Canvas. [Student Code](#). Do not come to class if you are symptomatic. If you are unwell or facing a struggle, you can make any missed days up if you speak to me or email me about it. You are required and expected to keep up with the course by attending class, reading announcements, and reviewing recorded lectures if you cannot attend in-person due to any reason. You are highly encouraged to join the Slack to attend office hours, view student discussions, and have an additional means to see announcements. If you miss class, I will always tell you to review the posted notes/video and take notes, request an extension on work if you need to, pick up your next paper assignment the next time you attend class. You are not required to tell me that you cannot come to class unless you are requesting an extension on a worksheet or project. When you email BOTH ME AND THE TA (wroblew3@illinois.edu AND hpanag2@illinois.edu) to tell me that you will or have already missed class, please address your email “AE 202 #-Day Extension” with the number of days you expect you will need to complete a worksheet that you cannot work on while unwell. If you cannot meet the new deadline you set with your extension request, please send another email of the same format setting yourself a new deadline.
- Projects: Partner Video Project: vehicle requirements and design drivers in historical context from a vehicle that was produced and operated. Must be well-researched.
Glider Catapult Project: this project is for a group of 3 with building components and will take place at Siebel Center for Design. This will have an individual video component and a group grade for a methodology document.
Group Vehicle Design Project: this project is for a group of 5 and will have group video presentation grade, group poster presentation grade, as well as individual research document grade.
- Worksheets: Worksheets will be given daily and due in one week as a scanned .pdf on Canvas. You must pick up your worksheet in person on paper unless you request accommodations to me via email. Your scanned .pdf document must be: legible, high enough resolution to read and grade, not taken with a greasy phone camera, not blurry, without giant shadows of your head or phone from the light above you, etc. If your worksheet is problematic, the grader will give you a zero and tell you to rescan and resubmit. You have two days to resubmit otherwise the assignment will be marked late.

You will take your worksheet home with you before turning it in one week later to correct any errors. No solutions will be posted but the answers will be discussed during class and on the slack during office hours. These discussions are not necessarily complete solutions, and you should not copy them directly without thought, as you may miss steps that will be graded for credit. The rubric of point distribution for each problem will be on the worksheets themselves. You are responsible for showing all work and having units on your worksheet solutions. You are responsible for scanning your paper worksheet to turn it in for credit. If you are unwell the day a quiz is taken or due back, I will give you an extension if email BOTH ME AND THE TA about it. There are no dropped assignments.

Exams: The final exam will be cumulative and based on the worksheets, the worksheets are based on the class lesson and project content. You will receive a mock exam packet near the end of the semester worth four worksheets, this past year's exam content and your current year's worksheets will be the basis of the final exam content.

Grading: Time Management Score (10%)
Worksheets (30%)
Partner Vehicle History Video Project (15%)
Group Glider Catapult Prototyping Project (15%)
Group Vehicle Design Requirements Project (15%)
Final Exam (15%)

Grading and GPA Grade Scale from Canvas Breakdown:

97.00 – 100.00	A+	4.0
93.00 – 96.99	A	4.0
90.00 – 92.99	A-	3.67
87.00 – 89.99	B+	3.33
83.00 – 86.99	B	3.0
80.00 – 82.99	B-	2.67
77.00 – 79.99	C+	2.33
73.00 – 76.99	C	2.0
70.00 - 72.99	C-	1.67
67.00 – 69.99	D+	1.33
63.00 – 66.99	D	1.0
60.00 - 62.99	D-	0.67
below 60	F	0.0

Extra Credit: There is an extra credit option that will add one percentage point to your final grade out of 100%. The Extra Credit Option for FALL 2024 is TBD.

Integrity

You are not to use AI to generate your assignments. You are not to use AI to generate art or graphics for the design projects. You are highly encouraged to learn digital art skills instead. If you have questions or want help with this, feel free to ask Dr. Wroblewski. If you want to do all of your own work with the course notes, office hours, and collaboration with peers, solve and finalize the problems, and then use AI to compare results and assess your own understanding, that would be okay with me. If you want to use AI to help you begin writing python script, that is okay with me only if you are then commenting all of your code for AE 202 following our course troubleshooting/commenting conventions before attempting to submit. If you want to spend your time outside of class learning how to use AI commercial tools, you are welcome to do so. The aerospace industry is a regulated industry. The expectation I have is that by being in AE 202 you want to learn how to solve problems and be responsible engineers who understand physical science and the limitations of various approximate methods. If you cannot develop the skills to solve problems on your own, you are not developing the required skill to validate AI solutions. More importantly, you are not learning how to implement tools in a way that prioritizes safety of a final engineering product that could harm passengers, maintenance workers, manufacturing workers, operators, pilots, bystanders, or the environment. You need to all learn, as individuals, the content of the course. If you want to learn how to develop AI or Machine Learning tools to solve unique and complicated engineering problems, consider taking CS 440 or CS 441 or similar courses.

Collaboration with classmates on assignments is encouraged: you can assist and direct, check numerical values for solutions with other students, and explain components of the process, but you ***should not volunteer to do the work for anybody besides yourself***. I will offer extensions to anyone who is struggling to keep up with work due to emergencies, complicated circumstances, or failures in time management. Email BOTH ME AND THE TA “AE 202 2-Day extension” to receive an automatic extension on any project or worksheet. If you do the work for someone else or copy work from someone else, it is an infringement of academic integrity policy and I am mandated to report such infringements through the FAIR system. I expect you to try to do your own work and accept the grading penalties for work that is incorrect, incomplete, or poorly done. [See the Student Code for more information on academic integrity.](#)

The instructor reserves the right to make any changes they consider academically advisable. Such changes, if any, will be announced in class.

Additional Resources: Any book at the library that you like about aerospace engineering that is written in a way that you understand is fantastic.

Otherwise:

John D Anderson Jr. "Introduction to Flight"

Thomas R Yechout "Introduction to Aircraft Flight Mechanics"

William E Wiesel "Spaceflight Dynamics"

Roger R Bate, Donald D Mueller, Jerry E White "Fundamentals of Astrodynamics"

More TBD

Campus Information & Mandated Reporting Notice

Disability Resources and Educational Services:

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability@illinois.edu or go to the DRES website. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting “Sign-Up for an Academic Screening” at the bottom of the page.

Writer’s Workshop: If you are interested in obtaining information to improve writing, study skills, time management or organization, the following campus resources are available to all students: [Writers Workshop \(illinois.edu\)](#)

Academic Assistance Links:

[Office of the Dean of Students at the University of Illinois \(uiuc.edu\)](#)

[Office of Minority Student Affairs at the University of Illinois](#)

[Home | International Student & Scholar Services \(illinois.edu\)](#)

[Center for Academic Resources in Engineering \(CARE\)](#)

Health

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University’s resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

Sexual Misconduct Policy and Reporting

The University of Illinois is committed to combating sexual misconduct. As such, you should know that faculty and staff members are required to report any instances of sexual misconduct—which can include harassment, sexual assault, sexual exploitation, dating violence, domestic violence, and stalking—to the University’s Title IX & Disability Office. What this means is that as your instructor, I am required to report any incidents of sexual misconduct that are directly reported to me, or of which I am somehow made aware. When a report is received, an individual with the Title IX & Disability Office reaches out to provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

There is an exception to this reporting requirement about which you should be aware. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: [Resources for Students, At Illinois We Care.](#)

University of Illinois Nondiscrimination Statement

The commitment of the University of Illinois at Urbana-Champaign (Illinois) to the most fundamental principles of academic freedom, equality of opportunity, and human dignity requires that decisions involving students and employees be based on merit and be free from invidious discrimination in all its forms. This policy is designed to promote a safe and healthy learning and work environment and to comply with multiple laws that prohibit discrimination, including: Equal Pay Act of 1963, Title VI and VII of the Civil Rights Act of 1964, the Americans with Disabilities Act Amendments Act, the Rehabilitation Act of 1973, the Age Discrimination in Employment Act of 1967, the Age Discrimination Act of 1975, Title IX of the Education Amendments Act of 1972, the Pregnancy Discrimination Act of 1978, the Uniformed Services Employment and Re-employment Act, the Vietnam-Era Veterans Readjustment Assistance Act of 1974, the Genetic Information Nondiscrimination Act of 2008, and the Illinois Human Rights Act. This policy and the associated procedures are established to provide a means to address complaints of discrimination or harassment based on the protected categories described herein.

It is the policy of the University not to engage in discrimination or harassment against any person because of race, color, religion, sex, pregnancy, disability, national origin, citizenship status, ancestry, age, order of protection status, genetic information, marital status, sexual orientation, gender identity, arrest record status, unfavorable discharge from the military, or status as a protected veteran and to comply with all federal and state nondiscrimination, equal opportunity, and affirmative action laws, orders, and regulations.

Land Acknowledgement Statement suggested by Native American House

“I/We would like to begin today by recognizing and acknowledging that we are on the lands of the Peoria, Kaskaskia, Piankashaw, Wea, Miami, Mascoutin, Odawa, Sauk, Mesquaki, Kickapoo, Potawatomi, Ojibwe, and Chickasaw Nations. These lands were the traditional territory of these Native Nations prior to their forced removal; these lands continue to carry the stories of these Nations and their struggles for survival and identity.

As a land-grant institution, the University of Illinois has a particular responsibility to acknowledge the peoples of these lands, as well as the histories of dispossession that have allowed for the growth of this institution for the past 150 years. We are also obligated to reflect on and actively address these histories

and the role that this university has played in shaping them. This acknowledgement and the centering of Native peoples is a start as we move forward for the next 150 years.”

How to respond to an emergency

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we’re faced with any kind of emergency – like fire, severe weather or if someone is trying to hurt you – we have three options: **run**, **hide** or **fight**.

Run: Leaving the area quickly is the best option if it is safe to do so.

- Take time now to learn the different ways to leave your building.
- Leave personal items behind.
- Assist those who need help but consider whether doing so puts yourself at risk.
- Alert authorities of the emergency when it is safe to do so.

Hide: When you can’t or don’t want to run, take shelter indoors.

- Take time now to learn the different ways to seek shelter in your building.
- If severe weather is imminent, proceed to the nearest indoor storm refuge area.
- If someone is trying to hurt you and you can’t evacuate, get to a place where you can’t be seen, lock or barricade your area, silence your phone, don’t make any noise and don’t come out until you receive an Illini-Alert indicating it is safe to do so.

Fight: You may need to fight to increase your chances of survival.

- Think about what kind of common items are in your area which you can use to defend yourself.
- Team up with others to fight if the situation allows.
- Mentally prepare yourself – you may be in a fight for your life.

Please be aware of persons with disabilities who may need additional assistance in emergency situations.

Other resources:

<https://police.illinois.edu/safe> for more information on how to prepare for emergencies, including how to run, hide or fight and building floor plans that can show you safe areas.

<http://emergency.illinois.edu/> to sign up for Illini-Alert text messages.

Follow the University of Illinois Police Department on Twitter and Facebook to get regular updates about campus safety.

Learn more about your building

Taking a minute to review exits, storm refuge areas, areas of rescue assistance and evacuation assembly areas in building that you use often could save your life in an emergency.

[View all building floor plans.](#) For Everitt: [B0037-1.png \(illinois.edu\)](#)