



Course Syllabus

ME EN 5960/6960 – Aircraft Flight Mechanics

Department of Mechanical Engineering

Fall 2025

Instructor:	Xiaowei He
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Office:	MEK 1339
Office Hours:	Tuesdays and Thursdays 1030–1130 hours
Lectures:	Tuesdays and Thursdays 0910–1030 hours
Location:	WEB 1450
Credit Hours:	3
Prerequisites:	ME EN 2030 – Dynamics ME EN 3220 – Dynamic Systems and Control
Corequisite: (recommended)	ME EN 5710 – Aerodynamics
Recommended Texts:	Students are not required to purchase textbooks. All required materials are covered by lecture notes. The recommended reading reference is <ul style="list-style-type: none">• Yechout, T. R., <i>Introduction to Aircraft Flight Mechanics</i>, 2nd edition, AIAA Education Series, 2014. ISBN 978-1-62410-254-7.
Course Description:	Intro- to intermediate-level aircraft flight mechanics. Performance, static stability, equations of motion, linearization and dynamics, dynamic stability, and linear control systems of aircraft flying in the atmosphere. Topics include: <ul style="list-style-type: none">• aircraft performance: takeoff and landing, gliding and climbs, turns;• aircraft equations of motion: kinematics and dynamics of airplanes;• aircraft static stability: longitudinal stability, lateral stability, directional stability;• linearized equations of motion: small perturbations, transfer functions, state space;• aircraft dynamics: dynamic stability, characteristic equation, longitudinal modes of motion, lateral modes of motion, stability and control derivatives;• introduction to aircraft feedback control.
Course Objectives:	<ul style="list-style-type: none">• Derive equations of motion of aircraft.• Evaluate general flight performance for a given aircraft.• Analyze static and dynamic stability of aircraft.• Characterize and modify the dynamic response of a given aircraft.• Analyze flight control systems through a linear approach.

Evaluation:	Homework	10%	Grading	
			Letter	Scoring
Midterm exam 1	Thursday, 18 SEP 2025, 0910–1030 hours	30%	A	93% – 100%
			A–	90% – 92.9%
			B+	86% – 89.9%
Midterm exam 2	Thursday, 30 OCT 2025, 0910–1030 hours	30%	B	83% – 85.9%
			B–	80% – 82.9%
			C+	76% – 79.9%
Final exam	Tuesday, 09 DEC 2025, 0800–1000 hours	30%	C	73% – 75.9%
			C–	70% – 72.9%
			D+	66% – 69.9%
	No rescheduling or make-up for exams.		D	63% – 65.9%
			D–	60% – 62.9%
			E	0% – 59.9%

Assignments: Assignments are graded on a completion basis. Hard copies only. Students registered for ME EN 6960 must complete the projects in the assignments independently, whereas collaboration is allowed for ME EN 5960 students. Assignments are due at 1030 hours on the due dates.

Late Assignments: Late assignments will not be accepted.

Computers and Software: Students are expected to have access to computers with MATLAB and Simulink installed. The computers should be adequate for running small-scale simulations. Students can obtain their free MATLAB and Simulink licenses from the University Office of Software Licensing <https://software.utah.edu/mathworks.php>.

Communication: Email communication. Please use a university email address to send direct emails to the instructor's email address. Please do not use Canvas messages. Canvas messages will not be responded.

Copyright: Lecture notes and assignments are for class use only. The instructor reserves the copyrights thereof. Do not distribute without permission.

Disclaimer: **Changes to the Syllabus**

This syllabus is not a contract. It serves as an outline and guide for the course. Please note that the instructor may modify it to accommodate the needs of the class. Appropriate notices will be given for any changes to the syllabus.

- *Homework* — Discussions on homework problems are allowed. However, students must submit their own work for assignments. Collaboration, plagiarism, and cheating in homework assignments are considered academic misconduct.
- *Projects* — Collaboration is allowed for course projects, while each student must submit one's own results independently.
- *Exams/quizzes* — Discussion, collaboration, plagiarism, and cheating in exams and quizzes are considered academic misconduct.
- Academic misconduct will result in disciplinary consequences according to the University Student Code.

University Policies:

The Americans with Disabilities Act

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability & Access.

University Safety Statement

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit <https://safeu.utah.edu>.

Addressing Sexual Misconduct

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 383 South University Street, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Academic Misconduct Statement

It is expected that students adhere to University of Utah policies regarding academic honesty, including but not limited to refraining from cheating, plagiarizing, misrepresenting one's work, and/or inappropriately collaborating. This includes the use of generative artificial intelligence (AI) tools without citation, documentation, or authorization. Students are expected to adhere to the prescribed professional and ethical standards of the profession/discipline for which they are preparing. Any student who engages in academic dishonesty or who violates the professional and ethical standards for their profession/discipline may be subject to academic sanctions as per the University of Utah's Student Code: <https://regulations.utah.edu/academics/6-410.php>.

Other important information:

Student Code:

<http://regulations.utah.edu/academics/6-400.php>.

Accommodation Policy (see Section Q):

<http://regulations.utah.edu/academics/6-100.php>.

Class Schedule

Week	Lecture	Date	Topic	Reading (Yechout)	Homework
1	1	Tue, 08/19	Intro, review	Chapt. 1 & 2	
	2	Thu, 08/21	Review, definitions	Chapt. 4.1 & 4.2	
2	3	Tue, 08/26	Definitions	Chapt. 4.1 & 4.2	
	4	Thu, 08/28	Aircraft performance	Chapt. 3	
3	5	Tue, 09/02	Aircraft performance	Chapt. 3	HW 1 due
	6	Thu, 09/04	Aircraft performance	Chapt. 3	
4	7	Tue, 09/09	Aircraft performance	Chapt. 3	
	8	Thu, 09/11	Aircraft performance	Chapt. 3	
5	9	Tue, 09/16	Aircraft static stability	Chapt. 5	HW 2 due
	–	Thu, 09/18	Midterm exam 1		
6	10	Tue, 09/23	Aircraft static stability	Chapt. 5	
	11	Thu, 09/25	Aircraft static stability	Chapt. 5	
7	12	Tue, 09/30	Aircraft equations of motion	Chapt. 4	HW 3 due
	13	Thu, 10/02	Aircraft equations of motion	Chapt. 4	
8	–	Tue, 10/07	Fall break - no class		
	–	Thu, 10/09	Fall break - no class		
9	14	Tue, 10/14	Aircraft equations of motion	Chapt. 4	
	15	Thu, 10/16	Aircraft equations of motion	Chapt. 4	
10	16	Tue, 10/21	Linearized equations of motion	Chapt. 6	HW 4 due
	17	Thu, 10/23	Linearized equations of motion	Chapt. 6	
11	18	Tue, 10/28	Linearized equations of motion	Chapt. 6	
	–	Thu, 10/30	Midterm exam 2		
12	19	Tue, 11/04	Linearized equations of motion	Chapt. 6	HW 5 due
	20	Thu, 11/08	Aircraft dynamics	Chapt. 7	
13	21	Tue, 11/11	Aircraft dynamics	Chapt. 7	
	22	Thu, 11/13	Aircraft dynamics	Chapt. 7	
14	23	Tue, 11/18	Aircraft dynamics	Chapt. 7	HW 6 due
	24	Thu, 11/20	Aircraft dynamics	Chapt. 7	
15	25	Tue, 11/25	Aircraft dynamics	Chapt. 7	
	–	Thu, 11/27	Thanksgiving - no class		
16	26	Tue, 12/02	Intro to feedback control	Chapt. 8	HW 7 due
	27	Thu, 12/04	Intro to feedback control	Chapt. 8	
17	–	Tue, 12/09	Final exam Location: WEB 1450 Time: 0800–1000 hours		

Note: This is a tentative schedule for the course. Please note that it may be modified with reasonable notice.