

AE 4531

Aircraft Flight Dynamics

Fall 2026

Professor Chance McColl, PhD

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ESM 203A

SYLLABUS

Health and well-being

- Georgia Tech and the School of Aerospace Engineering understand that many students experience stress through a variety of academic, financial and personal experiences. We value you and want to make you aware of resources available to you should you need them. Your well-being and mental health are important, and we are here for you.

- Center for Assessment, Referral and Education (CARE) <https://care.gatech.edu/>
- Campus Police (any emergency): 404-894-2500 <http://www.police.gatech.edu/>
- Counseling Center: 404-894-2575 <https://counseling.gatech.edu/>
- Dean of Students Office: 404-894-6367 <https://studentlife.gatech.edu/>
- Georgia Crisis and Access Line: 800-715-4225
- National Suicide Prevention Lifeline: 800-273-TALK (8255) <https://suicidepreventionlifeline.org/>
- Crisis Text Line: Text HOME to 741741
- VOICE: Victims Survivor Support: 404-385-4464 (or 4451) <http://healthinitiatives.gatech.edu/well-being/voice>
- Stamps Health Services <https://health.gatech.edu/contact>

Other resources:

- [Office of Disability Services](#)
- [Georgia Tech Honor Code](#)
- [Student-Faculty Expectations Agreement](#)
- The last day to withdraw with a W grade (**October 25**); see [VI. Scholastic Regulations, I. Course Requirements](#)

Course structure, expectations

- We will follow the USG/Georgia Tech general health/COVID-19 protocols, course attendance policies, etc.
- Grading will be based on HW assignments, 2 in-class exams, as well as an in-class final exam
- We will adhere to the [Georgia Tech honor code](#)

Course structure, expectations

- **Professor's right policy**
 - The professor reserves the right to change the course within Georgia Tech policy
 - Due dates are tentative and for general information; they may be shifted to other dates at the discretion of the professor
- **Academic integrity**
 - All graded components of this course (homework, exams) are to be the sole efforts of the individual student unless otherwise specifically stated in writing by the professor
 - As I'll say at the top of each homework assignment: "discussion with other classmates is fine; but make sure the final product is your own work"
 - Copying from another person's draft/final work or direct use of anyone else's work (including old programs / prior semesters' solutions) is a direct violation of the Georgia Tech honor code
- **AI policy**
 - Generative AI-based **assistance**, such as, but not limited to ChatGPT and Copilot, is comparable to collaboration with other people
 - For an individual assignment, the use of generative AI to fully solve a problem is a violation of the Georgia Tech honor code

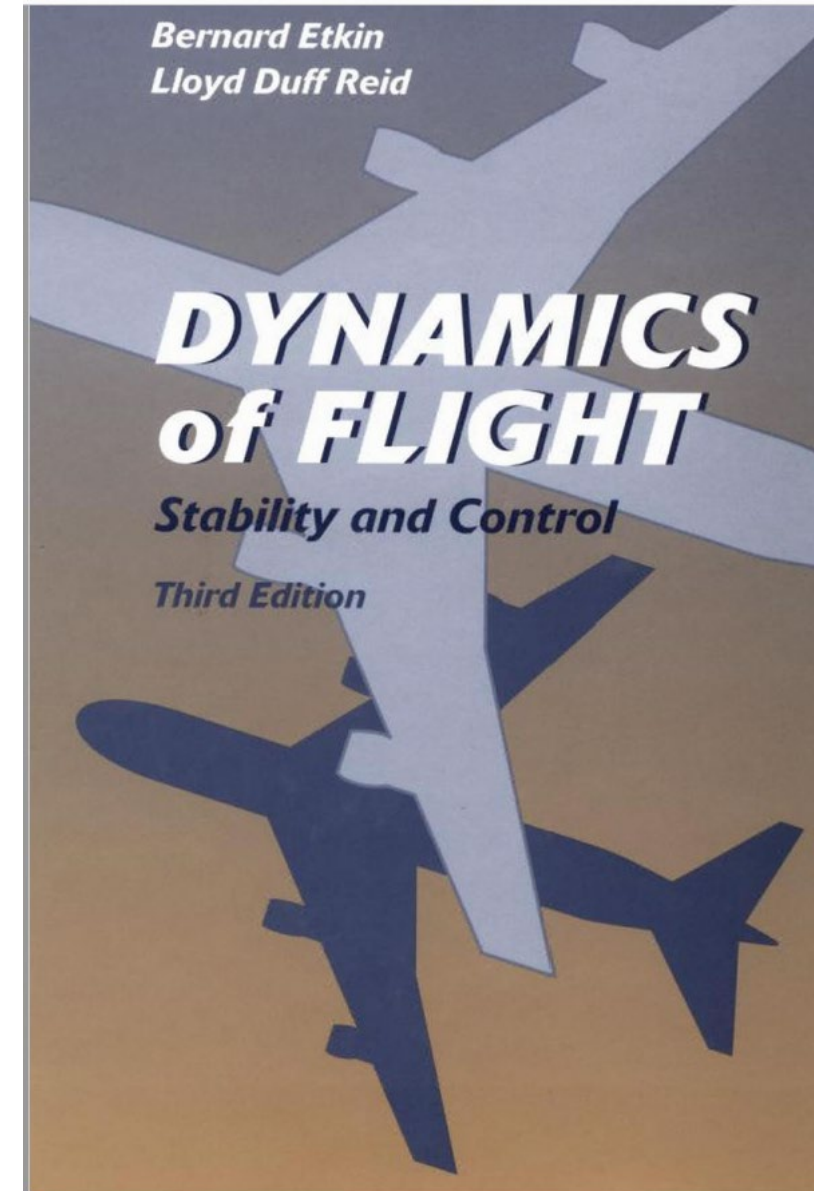
About the instructor

- **Professor Chance McColl, PhD** chance@gatech.edu (404) 290-8841 (cell)
- Dr. McColl is a Professor of the Practice at Georgia Tech (2015-present).
- Dr. McColl has 30+ years' experience as an aircraft structural loads engineer. He serves as Vice President of TDA (Technical Data Analysis, Inc.; Virginia, Maryland, and Georgia) and oversees TDA's loads engineering (fixed wing, rotary wing, UAS) and software development efforts for US military (USN, US Army, USAF) and govt (NASA, NOAA), international (Australia, Canada, Germany, Norway, Greece, Netherlands, Portugal, South Korea) and industry (General Atomics, Sikorsky, Northrop Grumman, Sierra Nevada Corporation, etc.).
- Dr. McColl has been with TDA since 2001. Prior to that, he was a lead loads engineer, both at Boeing and Lockheed Martin.
- Dr. McColl received his BS in Aerospace Engineering from the University of Colorado at Boulder and his MS and PhD in Aerospace Engineering from Georgia Tech. Dr. McColl has served as co-chair of the Georgia Aerospace Policy Working Group and as a member of the Georgia UAS Working Group.
- Over the past 20+ years, Dr. McColl has taught numerous aircraft external loads and aeroservoelastic control courses for clients such as the US Navy, USAF, General Atomics Aeronautical Systems, Sierra Nevada Corporation, and Korean Aerospace Industries.

SYLLABUS

Course overview

- Expectations
 - See “Course structure, expectations,” above
 - Georgia Tech honor code
 - Attendance: 4 **unexcused** absences allowed (you’re responsible for missed material and/or turning in HW) – does not apply to exam dates
 - **Beyond that, final grade dropped by 1 letter grade**
 - AE 4531: pre-reqs:
 - AE 3030 (Aerodynamics)
 - AE 3530 (System Dynamics); AE 3531 is a co-req
 - **Matlab, Simulink, other tools/codes**
 - Cell phone, tablet, laptop use
 - Homework
- **Textbook: *Dynamics of Flight (3rd ed.)*, Etkin, Reid**
 - ISBN: 0-471-03418-5
- Acknowledgements: course content includes a range of sources, including Etkin



Grading scheme

A/B/C/D = 90/80/70/60

- 35% Homework
- 20% Exam #1
- 20% Exam #2
- 25% Final exam

- I always add 1 point before computing final grades:
 - An 89 becomes a 90 (A)
 - An 88.5 becomes an 89.5 (B)
 - A 79 becomes an 80 (B)
 - A 78.9 becomes a 79.9 (C)
 - etc.
- **Beyond that, no further grade changes made**

- All homework will be submitted electronically via Canvas
 - **You have 1 week from receipt of graded homeworks and exams 1 and 2 to discuss any grade changes; after that 1 week, all grades are final**
- **Homework submission policy:**
 - All homework is due on the assigned date by 11:59 PM EDT via single pdf Canvas upload
 - Late homework accepted up to 24 hours late with a 25% penalty
- Some (but not all) notes will be provided electronically

Objectives

- Three-dimensional rigid body dynamics
- Aircraft equations of motion
- Static and dynamic stability
- Flight control design
- Introduction to aeroelastic phenomena

Learning outcomes, course topics

1. Static Stability and Control
2. General Equations of Unsteady Motion
3. Stability Derivatives
4. Stability of Uncontrolled Motion
5. Response to Actuation of the Controls-Open Loop
6. Closed-Loop Control