EAS 4400 : Stability and Control of Aircraft

Class Periods: M,W,F 3rd period (0935-1025)
Location: On-Line (access via https://elearning.ufl.edu)
Academic Term: Fall 2020

Instructor
Rick Lind
ricklind@ufl.edu
352.672.0604
Office Hours over email/zoom : M,W (10:40-11:30)

Teaching Assistants
Logan Smith
logan.smith@ufl.edu
Office Hours over email/zoom : T (9:35-11:30) and F (1:55-3:50)

Miguel Alizo
miguelalizo@ufl.edu
Office Hours over email/zoom : T (1:55-3:50) and Th (11:45-1:45)

Course Description (3 credits) Static stability and control, equations of motion, stability derivatives, stability of longitudinal and lateral motion of aircraft

Course Pre-requisites
EAS 4101 and EML 4312

Course Objectives
This course will demonstrate the principles that govern aircraft. You will learn issues associated with flight dynamics such as nonlinear and linear equations of motion, static and dynamic stability, longitudinal and lateral-directional modes, and aircraft responses to excitation. You will learn to relate systems concepts, such as transfer functions and state-space representations, to these flight dynamics. Most importantly, you will learn how to apply and utilize the fundamental theories from previous courses to evaluate novel configurations of aircraft.

Professional Component (ABET) This course will instruct students on formulating and understanding the mathematics of flight dynamics as applied to aerospace systems.

Relation to Program Outcomes (ABET)

	Outcome	Coverage
(1)	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	HIGH
(2)	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	LOW
(3)	an ability to communicate effectively with a range of audiences	LOW
(4)	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5)	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6)	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	MEDIUM
(7)	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	LOW

Materials and Supply Fees This course does not have any fees.

Required Textbooks and Software
This course does not have a required textbook.

Recommended Materials

- Thomas Yechout, Steven Morris, David Bossert and Wayne Hallgren, "*Introduction to Aircraft Flight Dynamics*, AIAA, 2002, ISBN 1-56347-577-4.
- Warren F. Phillips, "*Mechanics of Flight*, Wiley, 2010, ISBN 978-0-470-53975-0.

Course Schedule
The first part of the course will cover flight dynamics by introducing concepts of nonlinear and linear equations of motion, static and dynamic stability, longitudinal and lateral-directional modes and aircraft responses to excitation. The second part of the course will cover systems analysis by introducing concepts of transfer functions, state-space models, and flight controls.

On-Line Course Recording
Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the chat feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Attendance and Expectations
Students are required to attend every lecture. The entirety of exams and homeworks are constructed based on content and concepts presented in these lectures so you will not be properly prepared if you do not attend class. The lectures and recommended textbooks are meant to present complementary approaches and examples so the textbooks are supplementary to, but not replacements for, the lectures.

Evaluation of Grades

tentative date	event	course value
	EXAMS	70%
October 9	exam01	(10%)
October 16	exam02	(30%)
December 2	exam03	(30%)
December 9	exam03	(30%)
	HOMEWORK/QUIZZES	30%
October 7	homework01	(10%)
November 9	homework02	(10%)
November 23	homework03	(6%)
November 30	homework04	(4%)

Grading Policy
Grades will be determined based on a curve that reflects the level of difficulty for each homework and exam. This curve is not based on class performance or the student average; instead, the curve is determined before the exam is given based on the amount of partial credit allowed for each solution. In this way, there is not any pre-determined grade distribution which means everyone is able to get an A.

Grade Evaluation
Any exam for which a student wants the grade to be evaluated must be given to the instructor within 48 hours, and before the start of the subsequent lecture, of when the graded exams were available to the class.

Missed-Exam Policy
Students may request approval to miss an exam for academic/professional reasons as long as the request is submitted at least 2 weeks before the exam. A different exam will be given to the student usually before the scheduled exam or at the latest before the next lecture after the scheduled exam.

Cheating Policy
Submissions must strictly reflect your own work so any use of unauthorized materials (other students, notes, phones, computers, books) will be strictly penalized. Cheating on an exam or in-class quiz will be reported to the Dean of Students Office and will result in automatic grade of 0 for that exam or quiz. Such exams and quizzes will be monitored by proctors who may use photographs and video that will be presented as evidence of cheating.

Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at `https://gatorevals.aa.ufl.edu/students`. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via `https://ufl.bluera.com/ufl/`. Summaries of course evaluation results are available to students at `https://gatorevals.aa.ufl.edu/public-results/`.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (`https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/`) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action

will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources

- Health and Wellness
  - **U Matter, We Care:** Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.
  - **Counseling and Wellness Center:** http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
  - **Sexual Assault Recovery Services (SARS):** Student Health Care Center, 392-1161.
  - **University Police Department:** at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.
- Academic Resources
  - **E-learning technical support:** 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
  - **Career Resource Center:** Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.
  - **Library Support:** http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
  - **Teaching Center:** Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.
  - **Writing Studio:** 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.
  - **Student Complaints Campus:** https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
  - **On-Line Students Complaints:** http://www.distance.ufl.edu/student-complaint-process.