ENGR 4390.001 Special Topics: Introduction to Aircraft Aerodynamics and Performance Fall 2014
Section 0.001: 10:00-10:50 MWF, EN 108

Instructor: Dr. David Bridges, Associate Professor of Mechanical Engineering
Office: EN217A, x2181, email david.bridges@tamucc.edu
Office Hours: 3-5 p.m. TTH, others by appointment or as available

Course Description (future catalog): 3 sem. hrs. (3:0). Forces on aircraft; standard atmosphere; steady-state cruise, climb, and turn performance; performance optimization; introduction to aircraft longitudinal stability.

Course Description (narrative): In this course, students will learn the basics of aircraft performance. They will learn how to analyze the forces on an aircraft to arrive at expressions for performance (what can the aircraft do?) and performance optimization (what is the best it can do?). Students will examine steady-state aircraft range, endurance, climb, and turns, and will be introduced to the longitudinal stability of aircraft.

Course Learning Objectives: Upon completing this course, students will be able to

a. Demonstrate a basic understanding of the forces that act on an aircraft (a, b)
b. Demonstrate the ability to compute performance parameters for an aircraft (a, e, k)
c. Demonstrate the ability to obtain expressions for optimal performance parameters for an aircraft (a, e, k, l)
d. Demonstrate a basic understanding of aircraft longitudinal stability (a, e)
e. Demonstrate an improvement in their ability to read and interpret a technical document and to communicate their understanding to others (g, i)

(letters in parentheses refer to student outcomes for mechanical engineering)

Course Outline/Schedule (tentative, subject to change):

11 lectures: Introduction to aircraft geometry and nomenclature; airfoils and wings
Lift, drag, thrust, and weight
Standard atmosphere
Aerodynamics of the airplane – lift and drag coefficients and the drag polar
Thrust and power – jet engines and piston engine / propeller power
Equations of motion; steady level flight; thrust required
(Textbook sections 1.1 through 5.3)

Test #1 On or about 26 Sept 2014

11 lectures: Aircraft performance in steady flight
Thrust available and max speed
Gliding flight
Steady-state climbing flight
Range and endurance
(Textbook sections 5.4 through 5.16)
Aircraft performance in accelerated flight
Steady, level turns
(Textbook sections 6.1, 6.2)

Test #2 On or about 24 Oct 2014

12 lectures: Introduction to aircraft longitudinal stability (handouts)

Test #3 On or about 21 Nov 2014

3 lectures: Energy methods; load factors and the V-n diagram (Textbook sections 6.5, 6.6)

Final 8:00 am, Wednesday, 18 Dec 2013
Grading: Three one-hour tests will be given on dates announced at least two class periods in advance. These tests will make up 65% of the final course grade. Homework (which will include a few reading/writing assignments) and computer assignments will make up 15% of the final course grade, and a three-hour comprehensive final will make up 20% of the course grade. The homework and computer assignments will have different weights corresponding to the size of each assignment. Grades will be assigned on a 10-point scale: 90-100=A, 80-89=B, 70-79=C, 60-69=D, below 60=F.

Absences: Tests missed as a result of unexcused absences will result in a score of zero. Under most circumstances, the final exam grade will be substituted for tests missed due to excused absences. The absence must be excused in advance except in case of extreme emergency. No makeup exams will be given, except under unusual circumstances and entirely at the discretion of the instructor.

Communications: All outside-of-class communications will be conducted through the message and e-mail functions of the Blackboard site for the class. Each student should make sure his or her preferred e-mail address is the one in the Blackboard system, and each student should check e-mail and the Blackboard message site regularly.

Computer: Some of the homework assignments will involve the use of MATLAB™, a UNIX-based mathematical toolkit. Tutorial / review sessions instructing students in the basics of MATLAB™ will be scheduled early in the semester.

Academic Honesty: Academic honesty is expected at all times. Occurrences of cheating will be dealt with according to university regulations regarding academic misconduct.

Grade Appeals: A student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is on the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details on the process, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, consult Texas A&M University-Corpus Christi University Procedure 13.02.99.C2.01 Student Grade Appeal Procedures (http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage (http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school or the College of Science and Engineering Dean’s Office.

Disabilities Accommodations: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, 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 call or visit Disability Services at (361) 825-5816 in Driftwood 101.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

Drop Day: The last day to drop a class without a grade is Friday, 7 Nov 2014.