MAE 3306-001 Flight Performance & Stability
Spring 2015

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Office Hours: MW 1:00-2:30 PM

Section Information: MAE 3306-001

Time and Place of Class Meetings: Woolf Hall, Rm.311, MWF 10-10:50 AM

Description of Course Content:
MAE 3306 FLIGHT PERFORMANCE & STABILITY (3-0)
Brief review of fluid mechanic fundamentals, introduction to classical aerodynamics, introduction to aircraft performance and an introduction to aircraft static stability & control effectors. Topics covered include basic airfoil and wing theory, performance attributes (cruise, climbing, gliding, maneuvering, range, endurance, etc.) and static stability & control (longitudinal, lateral & directional stability) and control effectors and their operation.

Student Learning Outcomes:
With the successful completion of this course, the student shall have a basic understanding of classic aerodynamics and a basic understanding of the analysis techniques commonly used to predict aircraft performance, static stability and control.

Required Textbooks and Other Course Materials:
Departmental Required Textbook
"Mechanics of Flight – 2nd Edition" by Warren F. Phillips, John Wiley & Sons, Inc. 2010, ISBN 978-0-470-53975-0
References:

- Drela, M., "Flight Vehicle Aerodynamics", MIT Press, 2014.
- Gudmundsson, S., "General Aviation Aircraft Design: Applied Methods and Procedures", Butterworth-Heinemann, Waltham, MA, 2014
- Roskam, J. and Lan, C.T.E., "Airplane Aerodynamics and Performance," DARcorporation, First Edition, 1997
- McCormick, Barnes W., "Aerodynamics, Aeronautics, and Flight Mechanics, 2nd ed.," John Wiley & Sons, Inc, New York, 1995.
- Perkins, C. D., and Hage, R. E., "Airplane Performance, Stability and Control," John Wiley & Sons, Inc., 1949
- Hoerner, S. F., "Fluid Dynamic Drag: Practical Information on Aerodynamic Drag and Hydrodynamic Resistance," Hoerner Fluid Dynamics; 2nd edition (June 1965)
- Hoerner, S. F., "Fluid Dynamic Lift," Hoerner Fluid Dynamics; 2nd edition (June 1992)
- Anderson, J., "Fundamentals of Aerodynamics," 5th ed., McGraw Hill, 2010
- Abbott, I. H., and von Doenhoff, A. E., "Theory of Wing Sections: Including a Summary of Airfoil Data," Dover Publishing Co., 1959
- Dommasch, D. O., Sherby, S. S., and Connolly, T. F., "Airplane Aerodynamics," Pitman Publishing Corp., New York, 1961
- Von Mises, R., "Theory of Flight," Dover Publishing Co., 1959

- Gessow, A., and Myers, Jr., G. C., "Aerodynamics of the Helicopter," College Park Press, 1999
- Johnson, W., "Rotorcraft Aeromechanics," Cambridge Aerospace Series No. 36, April 29, 2013, ISBN: 1107028078 (If you like rotorcraft, this is the place to start!)
- Federal Aviation Regulation: Part 23 & Part 25
- MIL-C-005011B (USAF)
- AS-5263 (USNAVY)

Descriptions of major assignments and examinations:

Exams:

- 10 min quizzes, generally weekly, as required
- Comprehensive Final Exam

Projects:

- Individual projects will be assigned throughout the semester. Due dates and times will be rigorously enforced.

Homework:

- Homework will be assigned throughout the semester. Due dates and times will be rigorously enforced.

Attendance:

Attendance will follow university rules. Attendance will be taken at the beginning of each class period. Attendance will be a factor in the final letter grade.

Grading:

- Final Grade Weighting:

Projects and Homework:	33%
10 minute quizzes:	34%
Final Examination: (Comprehensive)	33%

- Grade Allocation: Course grades will be assigned

  A (90-100), B (80-89), C (70-79), D (60-69), F (less than 60)

  In order to receive a passing grade ("C" for Engineering), the weighted average of the 10 minute quizzes, projects & homework, and the final examination must be 70 or above.

  Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

Homework & Project Policy:

- Assigned homework and projects are due at the beginning of the class meeting of the due date.
- Due dates and times will be rigorously enforced. Late assignments will not be accepted.

Exam Policy:

- A comprehensive final examination will be given at the conclusion of the course.
- 10 minute quizzes will be given throughout the semester as topics are completed. Generally, these will occur weekly.
- There will be **NO** make-ups on quizzes. Missed quizzes will receive a grade of zero.
- The instructor must be notified at the beginning of the semester of any 'Special Needs EXAM' testing requirements. The student must be registered and approved for special testing allowances. If so, the student is responsible for obtaining and presenting the necessary forms to the instructor at least a week before the final. (Quizzes do not fall under this activity.)

Expectations for Out-of-Class Study:
Beyond the time required to attend each class meeting, students enrolled MAE 3306, a 3-credit hour course, should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc. (The general rule of thumb is for every credit hour earned, a student should expect to spend 3-hours per week working outside of class.)

Grade Grievances:
Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog.

Drop Policy:
Students may drop or swap (adding and dropping a class concurrently) classes through self-service in *MyMav* from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

Americans with Disabilities Act:
The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX:
The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity:
Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.
I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the

Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Lab Safety Training:
No lab training is required for this course.

Electronic Communication:
UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Student Feedback Survey:
At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week:
A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Student Support Services:
UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Course Schedule:
Topics covered:
Airplane Performance

- Review of Fundamental Fluid Mechanics
- The Standard Atmosphere
- Basic Aerodynamic Principles with Applications
    - Airfoil Theory
    - Wing Theory
    - Airplane Drag
- Airplane Propulsion Systems

    - Propeller Theory with Applications
    - Types of propulsion
- Fundamentals of Flight Performance
    - Climb and Glide Performance
    - Take-off and Landing
    - Range, Endurance And Payload-Range
    - Maneuvering and Flight Envelope
- Airplane Static Stability
    - Longitudinal Static Stability
    - Longitudinal Controls
    - Lateral-Directional Static Stability
    - Lateral-Directional Controls
- Every day “Rules of Thumb”