

MAE 5363-001 Intro to Rotorcraft
Spring 2015

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

Section Information: MAE 5363-001

Time and Place of Class Meetings: Woolf Hall, Rm. 311, MWF 9-9:50 AM

Description of Course Content:

MAE 5363 INTRODUCTION to ROTORCRAFT (3-0)

Introduction to rotorcraft analysis and performance, including the aerodynamics and dynamics of rotors, and the assessment of aircraft drag, basic vehicle performance, stability and control characteristics, evaluation of systems and an introduction to initial air vehicle sizing.

Student Learning Outcomes:

With the successful completion of this course, the student shall have basic understanding of how to analyze a classic helicopter, establish its basic performance, understand the importance of its different systems (transmission & drive train, etc.) and predict its performance.

Required Textbooks and Other Course Materials:

None

References:

- Professors notes

Descriptions of major assignments and examinations:

Exams:

- 10 minute quizzes, general weekly, as required when a topical area is completed
- 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 exams, 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-up 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.)
- Offsite personnel will receive summary exams in lieu of 10 min quizzes. They will be proctored by selected personnel at the facility and assigned online. This is not available to full time students in general attendance at the main campus.

Expectations for Out-of-Class Study:

Beyond the time required to attend each class meeting, students enrolled MAE 5363, 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://web.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**

- Basic fluid mechanics review and the Standard Atmosphere
- Historical review of different vertical lift concepts
- The Rotor
 - Introduction to Hover Theory
 - Momentum-Energy
 - Blade Element/Momentum models
 - Vortex-lattice/lifting-surface
 - Prescribed/free wake modeling
 - Autorotation
 - Introduction to Forward Flight Theory
 - Rotor Dynamics in Forward Flight
- Ducted fans and alternate propulsion
- Anti-torque Systems
 - Tail rotors
 - Fenestrans
 - Pneumatic systems
- Air Vehicle Drag
- Air Vehicle Propulsion Systems
- Fundamental Forward Flight Performance
 - HOGE, HIGE and VROC
 - Climb and Glide Performance
 - Range, Endurance And Payload-Range
 - Maneuvering and Flight Envelope
- Static Stability and Control
- Every day “Rules of Thumb”