

MAE 4321 Section 001 Air-Breathing Propulsion
Fall 2014
Tuesday, Thursday, 12:30 p.m. - 1:50 p.m.
SH 129

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| 1. Instructor: | Frank K. Lu |
| 2. Office Location: | 249A NH |
| 3. Office Hours: | Open door policy or by appointment (via email) |
| 4. Phone: | 2-2083 |
| 5. Fax: | 2-5010 |
| 6. Mailbox: | 19018 |
| 7. Email: | franklu@uta.edu |
| 8. Instructor WWW Site: | Blackboard |
| 9. Link to Additional Course Info: | |
| 10. Course Prerequisites: | MAE 3303 or 3311 |

11. Required Readings/Materials:

J.D. Mattingly – Elements of Propulsion: Gas Turbines and Rockets, AIAA, 2006
Course notes -- posted on course website

12. Course Description:

Development of thrust and efficiency relations, cycle analysis for ramjet, turbojet, and turbofan engines, component design and performance analysis, off-design performance analysis.

13. Course Learning Goals/Objectives:

- *To develop an ability to perform parametric analysis of a number of jet propulsion engines
- *To develop an ability analysis the performance of a number of jet propulsion engines
- *To develop an understanding of the aerothermodynamic performance of the major components of a propulsion system, on and off design

14. Attendance and Drop Policy:

Attendance is expected

15. Tentative Lecture/Topic Schedule (course content):

- Jet engine thrust/efficiency relations
- Ideal and non-ideal cycle analysis (basic concepts)
- Ramjet
- Turbojet
- Turbofan (Unmixed exhaust)
- Turbofan (Mixed exhaust)
- Turboprop
- Component performance parameters
- Parametric cycle design - selected engine

- Performance analysis - basic concepts
- Performance analysis - selected engine
- Subsonic inlet

- Supersonic inlet - external compression
- Nozzle (Convergent and convergent-divergent)
- Combustion chamber
- Turbomachinery - basic concepts
 - Axial flow compressor (mean radius analysis)
 - Axial flow compressor (radial variations)
 - Axial flow turbine

Specific Course Requirements with Descriptions

A. Quizzes (number and type):

none

B. Examinations (number and type):

One midterm

One final

C. Other Graded Assignments (Homework / Projects / Labs / Research Papers):

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|-----------------------------------|-----|
| • 5 HW assignments | 40% |
| • 3 projects (2 design and 1 lab) | 20% |
| • Midterm | 15% |
| • Finals | 15% |
| • Term paper | 10% |

A weight (commonly called “curve”) based on the highest overall score (raw score) will be used to determine the final individual scores prior to assigning the letter grade. The score will be rounded up.

Example:

Highest overall raw score = 95

Individual raw score = 85

Final individual score = $\frac{85}{95} \times 100 = 89.5 \rightarrow 90$. Final letter grade: A

D. Missed Exams, Quizzes and Makeup Work:

Missed exams (with a valid reason) must be made up immediately

No missed homework or projects will be accepted

Key Assignments – This course specifically assesses your ability to understand contemporary issues in aerospace engineering. Therefore, certain related assignments in this course must be passed in order to pass the course. During the semester, these assignments will be designated as key assignments. In order to pass this class you must pass all key assignments. If any key assignment that is not passed by the end of the course, you will not pass the class even if you score perfectly on all exams and other assignments. Key assignments will be specifically announced. Tardy key assignments will be accepted with penalties as per other assignments, namely, -10% per week for two weeks and then a grade of 0. Late key assignments will not be accepted during examination week.

E. Other Information:

Term paper – The topic for the term paper will be on a contemporary issue in airbreathing propulsion and subject to the approval of the instructor. The paper format is per modified AIAA format but **double-spaced**, see term paper author kit downloadable from course website.

- All references must be from journal or conference sources. Online sources are not acceptable.
- The grade for the term paper is broken down as follows:

1. Technical content	50%
2. Organization, including appropriate length	20%
3. Adequate and appropriate references	15%
4. Grammar and English	15%
- The term paper is due two weeks before the finals. You must submit both a paper and an electronic copy.

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, see http://www.uta.edu/catalog/content/general/academic_regulations.aspx#19.

Policy on cheating --- students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.

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://www.uta.edu/aao/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.

NOT LETTING THE INSTRUCTOR KNOW OR LETTING HIM KNOW WITH SHORT NOTICE BEFORE HOMEWORK DUE DATE, EXAM, ETC. IS NOT ACCEPTABLE AND WILL NOT BE EXCUSED OR HONORED. SUCH CASES WILL BE REFERRED TO THE OFFICE OF STUDENT CONDUCT FOR DISPOSITION

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Series 50101, Section 2.2)

You may not copy any portion of another student's homework or the homework solutions from last year, including sharing spreadsheet formulas and output. You may discuss homework and solution techniques with a fellow classmate only after you have attempted to solve the problem. After the discussion you must work the problem by yourself.

It is your responsibility to know University policies on these matters.

Students enrolled in this course 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.

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.

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.

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>.

NOT CHECKING MAVMAIL OR BLACKBOARD NOTICES IS NOT AN EXCUSE FOR "I WAS NOT INFORMED"

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.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting

the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

THIS SHOULD BE POSTED IN ALL SCHOOLS AND WORK PLACES



Love him or hate him, he sure hits the nail on the head with this! Bill Gates recently gave a speech at a High School about 11 things they did not and will not learn in school. He talks about how feel-good, politically correct teachings created a generation of kids with no concept of reality and how this concept set them up for failure in the real world.

Rule 1: Life is not fair - get used to it!

Rule 2: The world won't care about your self-esteem. The world will expect you to accomplish something BEFORE you feel good about yourself.

Rule 3: You will NOT make \$60,000 a year right out of high school. You won't be a vice-president with a car phone until you earn both.

Rule 4: If you think your teacher is tough, wait till you get a boss.

Rule 5: Flipping burgers is not beneath your dignity. Your Grandparents had a different word for burger flipping: they called it opportunity.

Rule 6: If you mess up, it's not your parents' fault, so don't whine about your mistakes, learn from them.

Rule 7: Before you were born, your parents weren't as boring as they are now. They got that way from paying your bills, cleaning your clothes and listening to you talk about how cool you thought you were. So before you save the rain forest from the parasites of your parent's generation, try delousing the closet in your own room.

Rule 8: Your school may have done away with winners and losers, but life HAS NOT. In some schools, they have abolished failing grades and they'll give you as MANY TIMES as you want to get the right answer. This doesn't bear the slightest resemblance to ANYTHING in real life.

Rule 9: Life is not divided into semesters. You don't get summers off and very few employers are interested in helping you FIND YOURSELF. Do that on your own time..

Rule 10: Television is NOT real life. In real life people actually have to leave the coffee shop and go to jobs.

Rule 11: Be nice to nerds. Chances are you'll end up working for one.

IF YOU AGREE , PASS IT ON. IF YOU CAN READ THIS - THANK A TEACHER!