AE6343-A/Q/R Aircraft Design I
Fall 2023 Syllabus

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Introduction

This document provides basic information regarding the Aircraft Design I (FWD I) class for the Fall 2023 academic term. The course is listed as AE6343 for 3 credit hours in the course catalog of the Georgia Institute of Technology. Section A is for students on US campus, section Q is for distance learning students and section R is for students on EU campus. Students who are taking AE6343 Aircraft Design I should register for AE6383 Applied Design Laboratory concurrently. AE 6383 is the laboratory portion of AE6343 where students will attend a series of seminars where they will improve their design skills and get familiar with the design tools available. Please read the following information carefully.

Class Website

The official FWD I class website is on Canvas at https://canvas.gatech.edu/. This website is intended to provide all official lecture material, handouts, presentations, notices and relevant information. Note that the website will be constantly updated and must be checked on a regular basis. All announcements are automatically emailed to your GT student account. It is the student's responsibility to maintain access to this account and address email filtering issues. To log in use your GT account username (usually your first name initial followed by your last name and a number, e.g., *gburdell3*) and your GT account user password. Once on Canvas, select the AE6343 course. Distance Learning students can access lecture videos through this website.

Class Schedule

The class meets Fridays from 2 PM to 4:45 PM in Lecture Hall 1 of the Weber Space Science and Technology (SST) building. Students who are on the main Georgia Tech campus are expected to attend in person. An effort will be made to provide lecture recordings to all students.

Calendar

The official school calendar of Georgia Tech is provided by the Office of the Registrar and is available at http://www.registrar.gatech.edu/home/calendar.php. Check this calendar for finals dates and times.

Class Objective

- Students will learn the concepts behind fixed wing vehicle design by learning material covering a wide breadth of aerospace engineering disciplines.
- Students will apply those concepts through projects aimed at designing fixed wing vehicles.

Required Reference

The following textbook is considered as required for class and is available either from online vendors or the AIAA store:

- Raymer, D. P., *Aircraft Design: A Conceptual Approach*, 6th Ed., Reston, Va.: AIAA, 2018.

- Mattingly, J. D., Heiser, W. H., Pratt, D. T., *Aircraft Engine Design*, 2nd Ed., Reston, Va.: AIAA, 2002.

Recommended References

These textbooks are recommendations for additional information on topics covered during the course:

- Anderson, J. D., *Fundamentals of Aerodynamics*, 6th Ed., Boston: McGraw-Hill Higher Education, 2016.
- Anderson, J. D., *Aircraft Performance and Design*, Boston: McGraw-Hill, 1999.
- Nicolai, L., Carichner G., *Fundamentals of Aircraft and Airship Design, Volume 1 - Aircraft Design*, AIAA, 2010.
- Nicolai, L., Carichner G., *Fundamentals of Aircraft and Airship Design, Volume 2 - Airship Design and Case Studies*, AIAA, 2013.
- Torenbeek, E., *Synthesis of Subsonic Airplane Design*, Delft University Press, 1982.
- Torenbeek, E., *Advanced Aircraft Design: Conceptual Design, Technology and Optimization of Subsonic Civil Airplanes*, John Wiley & Sons, Incorporated, 2013.
- Gere, J. M., Goodno, B., *Mechanics of Materials*, 8th Ed., Cengage Learning, 2012.
- Hill, P. G., Peterson, C. R., *Mechanics and Thermodynamics of Propulsion*, 2nd Ed., Reading, Mass.: Addison-Wesley, 1991.
- Nelson, R. C., *Flight Stability and Automatic Controls*, 2nd Ed., Boston, Mass.: McGraw Hill, 1998.

Exams

There will be two midterm exams and a final exam for this course. The final will take place according to Georgia Tech's final exam matrix. The exams are closed note, closed book. Students must bring a black or blue pen and a non-programmable calculator.

Distance learning students will arrange a time with a proctor to take their exam. This course will use digital proctoring for exams. A Georgia Tech representative will reach out to DL students with more details.

Examples of acceptable calculators:

- Texas Instruments TI-30XIIS
- Casio fx-300ESPLUS2

- Sharp EL-W535TGBBL
- HP 300s+

Class Projects

Two class projects will address material covered in lectures and give practical applications on design methodologies and tools. Students will evaluate their team members' contributions through peer reviews in each of these projects. These evaluations will then be used to calculate the final project grades of each student. All other details including instructions and project deliverables will be provided in project description handouts.

Grade Breakdown

The following is the grade distribution to be adopted in this class.

Exam 1	20%
Exam 2	20%
Project 1	15%
Project 2	15%
Final	30%

Please note that students with good performance in both exams and projects may be excused from the final exam - having the weights adjusted accordingly. Moreover, class participation is highly encouraged and will be taken into account for the students on the borderline grades.

The following scale relating numeric to letter grades will be used for the entire course:

- $90\% \leq \text{A} \leq 100\%$
- $80\% \leq \text{B} < 90\%$
- $70\% \leq \text{C} < 80\%$
- $60\% \leq \text{D} < 70\%$
- $0\% \leq \text{F} < 60\%$

Student Expectations

Lectures

Students are expected to participate in the lecture discussions and to ask questions whenever in doubt about class material. Lectures are performed in a discussion type atmosphere where

consistent questioning of concepts takes place and student engagement is crucial.

Late Submission Policy

Assignments submitted late will be assessed a flat 15% penalty. For example, if a project receives 90/100, but was submitted late, it will receive 75/100. If an assignment is marked late on Canvas, it will be considered late.

Usage of AI Tools

Students are forbidden from using generative artificial intelligence (AI) tools - *e.g.* ChatGPT, Google Bard, Microsoft Azure, etc - in any of their technical or graded assignments. If any unauthorized usage of these tools is detected, penalties in accordance with institute policies established by the Office of Student Integrity will be enforced.

Class Contents

- Requirements analysis
- Constraint and mission analysis for fixed wing vehicles
- Alternative energy vehicles
- Aerodynamics
- Propulsion
- Performance

Georgia Tech School of Aerospace Engineering Values

1. **Honesty:** The School of Aerospace Engineering values honesty and integrity of all members of our community. An important element of this value is the academic honor code.

   Georgia Tech Honor Challenge Statement: I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech community.

   Honor Code: Article I: Honor Agreement

2. **Well Being:** The School of Aerospace Engineering values the complete well-being of all members of its community, which includes professional, physical, spiritual, emotional, and social dimensions. There are numerous resources to support the health and well-being of all members of our community: Mental Health Resources

   Mental Health Resources:

   - Emergencies: Can either Call 911 or call Campus Police at 404.894.2500 http://www.police.gatech.edu/
   - Center for Assessment, Referral, and Ed. (CARE): 404.894.3498 (Counselor On-Call) https://care.gatech.edu/
   - Counseling Center: 404.894.2575 https://counseling.gatech.edu/
   - Stamps Health Services: 404.894.1420 https://health.gatech.edu/
   - Student Life and Dean of Students: 404.894.6367 https://studentlife.gatech.edu/content/get-help-now

- Victim-Survivor Support (VOICE): 404-385-4464/(or 4451) https://healthinitiatives.gatech.edu/well-being/voice
- National Suicide Prevention Lifeline: 988 or 1.800.273.TALK (8255)
- Georgia Crisis and Access Line: 1.800.715.4225

COVID-19 Safety
GT Safety Guidelines: https://health.gatech.edu/tech-moving-forward
Current guidance is summarized at the site above and please continue to follow the site above and other Institute communications in case changes occur

3. **Social Justice:** The School of Aerospace Engineering values social justice for all members of the Georgia Tech community and the larger society. Social justice means that everyone's human rights are respected and protected. We stand committed in the fight against racism, discrimination, racial bias, and racial injustice. Our shared vision is one of social justice, opportunity, community, and equity. We believe that the diversity and contributions from all of our members are essential and make us who we are. We believe that our impact must reach beyond the classroom, research labs, our campus, and the technology we create, but must also improve the human condition where injustice lives. We will continue to work to understand, value, and celebrate all people and create an inclusive educational and work environment that welcomes all.

   As a matter of policy, Georgia Tech is committed to equal opportunity, a culture of inclusion, and an environment free from discrimination and harassment in its educational programs and employment. Georgia Tech prohibits discrimination, including discriminatory harassment, on the basis of race, ethnicity, ancestry, color, religion, sex (including pregnancy), sexual orientation, gender identity, national origin, age, disability, genetics, or veteran status in its programs, activities, employment, and admissions. For more information, you can visit this website.