

# AE6373-A/Q/R Advanced Design Methods I Fall 2023 Syllabus

## **Course Instructor**

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## **Introduction**

Welcome to Advanced Design Methods I (ADM I) for the Fall 2023 academic term. The course is listed as AE6373 for 4 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. Section A01 is the lab for students on US campus and section Q01 is the lab for distance learning students. Students not on EU campus should register for both the lecture section (A or Q) and the lab section (A01 or Q01). Please read the following information carefully.

## Class Website

The official ADM 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 class information. Please check the website regularly to keep up with all updates. All announcements will be made through Canvas. 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 AE6373 course. Distance Learning students can access lecture videos through this website.

## Class Schedule

Class meets Mondays and Wednesdays from 3:30 PM to 6:15 PM in the Klaus Advanced Computing Building 1456. 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>.

## Class Objectives

- Introduce students to complex systems design methodologies from theoretical and practical perspectives.
- Complete a project which demonstrates mastery of system design methodologies by applying them on a commercial aircraft design study.

## Recommended References

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

- Myers, R. H., Montgomery, D. C., *Response surface methodology: process and product optimization using designed experiments*, 3rd Ed., Hoboken, N.J.: Wiley, 2009.
- Breyfogle, F. W., *Implementing Six Sigma: Smarter Solutions Using Statistical Methods*, 2nd Ed., Wiley & Sons, 2003.

## 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 Project

One class project will be assigned within the first few weeks and run for the majority of the course. Topics covered in lectures will be applied on this project. Towards the end of the semester, lab periods will not introduce new material. The lab meeting times are reserved so students can work on the project and meet with their teams.

The deliverables for the project are as follows:

- A presentation summarizing the project
- A report summarizing the project

A detailed class project description will be provided during the semester. Students will evaluate their team members' performance and those evaluations will factor into the individual grades.

A project called the Scouting Assignment will be given at the beginning of the course. This will be a group research project into the state of commercial aviation.

## Grade Breakdown

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

Please note that students with good performance in both exams and project 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.

Exam 1	15%
Exam 2	15%
Scouting	5%
Project Presentation	10%
Project Report	25%
Final	30%

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

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

## 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**

- Motivation for Advanced Design Methods
- The Design Paradigm Shift
- Quality Engineering: Taguchi Methods, Six Sigma, and Robust Parameter Design
- Experimental designs and Analysis of Variance (ANOVA)
- Probability and Statistics
- Response Surface Methodology
- Advanced Surrogate Models
- Technology Infusion
- Decision Making Techniques
- Economics of Aircraft Manufacture and Operation
- Other Design Methods

# 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](#).