AE6373-A/Q/Q3 Advanced Design Methods I
Fall 2025 Syllabus

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Introduction

Welcome to Advanced Design Methods I (ADM I) for the Fall 2025 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 Q3 is for students on EU campus. Section A01 is the lab for students on US campus and section Q01 and Q31 are the lab for distance learning students and EU students. Students should register for both the lecture section (A, Q or Q3) and the corresponding lab section (A01, Q01 or Q31). 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 communications will be made through Canvas, any questions regarding projects, homework or quizzes will posted on Piazza and will be answered on Piazza. 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. On campus students will not have access to lecture videos until the end of the semester. Any exceptions shall be discussed on a case by case basis with the TAs.

Lectures

Class meets Mondays and Wednesdays from 3:30 PM to 6:15 PM in the Weber Space Science and Technology (SST) III Lecture Hall 1 for students in section A. Students who are on the main Georgia Tech campus are expected to attend in person. Students in sections Q and Q3 are welcome to join the live lectures using the link on the class website. The class recordings should be made available for students of Q and Q3 sections on the class website shortly after the end of the class.

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 Objectives

- Introduce students to complex systems design methodologies from theoretical and practical perspectives.
- Complete a project which demonstrates the application of design of experiments (DoE) to characterize the uncertainty in a physical process.
- 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 and are not required to be bought:

- 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.

Learning Support Materials

Practice Homework

Past semester homework assignments on specific topics will be provided along with solutions as practice material for the midterms and are therefore ungraded.

Practice Quizzes

Similarly, at the end of major sections of the course, there will be a 10-15 online quiz that will be made available on Canvas to test the understanding of basic concepts as a practice. This will be a canvas quiz with multiple-choice/ true or false answers that can be taken any number of times and also is ungraded.

Comprehensive Exam

There will be two midterms for this course each covering a subset of topics that will be announced later during the course based on the course progression. The exams will be held on 24th September and 19th November **tentatively** and is closed notes and closed books. Any changes to this schedule will be communicated in a timely fashion. Students must bring a pencil and a non-programmable calculator. Examples of acceptable calculators:

- Texas Instruments TI-30XIIS
- Casio fx-300ESPLUS2
- Sharp EL-W535TGBBL
- HP 300s+

Students in the Q and Q3 sections will arrange a time with a proctor to take their exam. A Georgia Tech representative will reach out to these students with more details, but the current plan is to use digital proctoring for Q exams and a local proctor for A and Q3 exams.

Class Projects

Two class projects that are assigned to groups (about 4-5 students) will address material covered in lectures and give practical applications on systems design methodologies and tools.

1. DoE project: A project that focus on experimental design of given physical systems that will be assigned after the DoE lecture.
2. ADM project: A semester-long class project that will also 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.

   Please note that, due to calendar constraints, the ADM project final presentations may have to occur outside of regular class times on 1st to 2nd December during the **final instructional days** of the Fall semester . The teaching staff will elaborate on this matter further along the course.

All other details including instructions, project deliverables and helpful resources will be provided in project description handouts.

Students will evaluate their team members' performance and those evaluations will help with resolving any potential roadblocks that the team may encounter.

Peer & Self Assessments

Team members will assess the effort of themselves and each other against the target they deem to be appropriate. Each assessment will include a self-reflection on what can be improved individually. It will also include a section on identifying issues that can be improved if other team members can adjust their behaviors. Assessments are private between the instructors and the students and will not be shared with other students. A standardized form will be provided for collecting feedback.

Grading Policy

Table 1 shows the grade breakdown for this class.

Table 1: Grade Breakdown

ADM Project Presentation	15%
ADM Project Written Assignments	20%
Midterm 1	20%
Midterm 2	20%
DoE Project	20%
Self & Peer Assessment	5%
Attendance (see Table 2)	5% bonus
CIOS survey (see below)	5% bonus

Table 2: Attendance Bonus Points Policy

$< 50\%$	0 points
50% to 70%	3 points
70% to 85%	4 points
85% and above	5 points

An additional 5% bonus points will be awarded to everyone in the class if $\geq 80\%$ of the class fills the CIOS survey.

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

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

Once an exam's answer sheets is graded and returned to the student, each student will have 48 hours to submit any disagreement with respect to their grading. Please note that a request for regrade will imply in one of the TAs going through (and possibly regrading) the entirety of the exam.

Office Hours

Office hours will be held virtually and/or in-person in the TA Office (Weber 116) or the Weber atrium. To make communications manageable with a large class, the instructors expect the students to ask general questions through the Piazza tab in Canvas and during lectures instead of sending direct emails and messages. Similarly, questions about the quizzes, homework, comprehensive exam, projects, or class logistics should be asked through Piazza.

Unless a question is personal in nature, use the course canvas page and or piazza instead of sending direct Microsoft Teams messages or emails to the instructor or the TAs.

Find our class signup link at: To be updated

The TAs will hold office hours by appointment. Table 3 shows the links to the booking pages if you wish to book an office hour slot with the TAs and the time slot availability. Appointments can also be made via email with any of the TAs if the provided time slots don't work for you. However, if a private question must be asked, or you need something more reserved, a direct message such as an email is an appropriate alternative to attending office hours.

Table 3: TAs Availability & Booking Links

Link to the TA's Booking Page	**Day & Time (EST)**	**Location**
Balaji Ravikanti	To be determined	TA Office
Wiame Benzerhouni	To be determined	TA Office
Youssef Lamrini	To be determined	TA Office

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 20% penalty up to 7 days. Assignments not received after 7 days will receive a zero. For example, if a project receives 95/100, but was submitted within the availability of the assignment, it will receive 75/100. If an assignment is marked late on Canvas, it will be considered late.

Please note that there will be no extensions to the deadlines.

No Show Policy

Students in on-campus sections who do not take the exams in class will receive a 0, unless prior arrangements are made with the teaching staff. Refer to Table 2 for the attendance bonus points policy.

Cheating

Cheating will not be tolerated in any of the assignments or exams. This is a rigorous program and you are expected to submit your own original work. Regular checks will be performed and perpetrators will be penalized with a letter grade deduction from their final grade of the course.

Use of Past Student Work

For individual assignments, students are not allowed use materials created by students who took the class in previous years just like they are not allowed to use materials created by their current classmates. Such actions go against the nature of an individual assignment and will be treated as a violation of Honor Code.

Usage of AI Tools

Students are not allowed to create text or code using generative machine learning models and services in any of their graded assignments. While automatic text generation could be used to get students out of writer's block, all text turned in for grading must be students' own work (*i.e.*, model-generated text must never be copied into documents to be turned in for grading). Similarly, students are free to use such tools to get started with their coding assignments or discover issues with their work. However, none of the auto-generated code is allowed in the assignments that are turned in for grading. Furthermore, tools such as ChatGPT are not respectable sources and, if students use such tools during their research, statements must be backed up by real, referenceable, published work. If students have questions about the use of such tools, they must contact the instructors for clarifications and receive permissions for the use if they think it is legitimate. Any detection of unauthorized auto-generated text or code will be subject to penalties in accordance with institute policies established by the Office of Student Integrity. Any exceptional usage of AI allowed for specific assignments (if any) will be explicitly stated in assignment descriptions. Finally, students are reminded that they are attending school to learn new skills and methods and they should focus on attaining them rather than looking for shortcuts that are easily noticeable and reflect badly on their work ethic.

Course Content and Schedule

The following is a list of topics in this course:

- Motivation for Advanced Design Methods
- The Design Paradigm Shift
- Quality Engineering: Quality Function Deployment, Taguchi Methods, Six Sigma, 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.