AE 4451-A Jet and Rocket Propulsion Overview (Fall 2026)

Instructor: **Prof. Vigor Yang**
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Class Hours:

Section A: Monday, Wednesday, Friday 12:30-1:20 pm, Guggenheim Aerospace 442
Section B: Monday, Wednesday, 9:30-10:45 am, Manufacturing Research Center

Office Hours:

Prof. Vigor Yang
10:45-11:30 am Monday, Wednesday after class
1:20-2:00 pm Monday, Wednesday, Friday after class

Boxiao Jin (Section B)
Monday 2:00 – 4:00 p.m, Loewy Library or MK 402

Aaron Trinh (Section C)
Thursday 2:00 – 3:30 pm, Teams Meeting (see Canvas announcements for link)

Check Canvas daily for lecture notes, assignments, and communication.

Prerequisites:
AE 2010, Specific areas/concepts include:

1. thermodynamic concepts of properties and states
2. conservation equations (mass, momentum, energy, and entropy - Second Law of Thermodynamics)
3. control volume analysis
4. one- and two-dimensional compressible flows, e.g., normal and oblique shock, and supersonic flow with area change (nozzles)

Course Goals:
A student successfully completing this course will:

1. Gain familiarity with common types of aircraft and spacecraft propulsion systems.
2. Understand the physical concepts of thermodynamic cycle analysis, including the thermodynamic treatment of chemically reacting systems.
3. Be able to perform preliminary cycle design and performance analysis for propulsion systems, for both aircraft and spacecraft.
4. Have a working knowledge of the basic operation and design requirements of propulsion turbomachinery components (inlets, compressors, combustors, turbines, afterburners, and nozzles).

References:

1. *Rocket Propulsion Elements*, George P. Sutton, 7th ed., John Wiley & Sons, 2001.
2. *Mechanics and Thermodynamics of Propulsion*, 2nd Edition, Philip Hill and Carl Peterson, Addison-Wesley, 1992.
3. *Aerothermodynamics of Gas Turbine and Rocket Propulsion*, 3rd ed., Gordon Oates, AIAA Education Series, 1997.
4. *Elements of Gas Turbine Propulsion*, J. D. Mattingly, McGraw-Hill, 1996.
5. *Aircraft Engine Design*, J. D. Mattingly, W. H. Heiser and D. H. Daley, AIAA Education Series, 1987.
6. *Aerothermodynamics of Aircraft Engine Components*, Gordon Oates, ed., AIAA Education Series, 1985

Attendance:
Roll call will be conducted randomly. If you miss two or more lectures, a penalty of up to two percentage points will be deducted from your final grade. If you attend 100% of lectures, there will be potential for grade rounding (i.e. 87% becomes an 88% or A) based on the instructor's discretion at the end of the semester.

Homework:
Through the semester, homework will be given to cover all the knowledge in this course.
Due the following week and submit before the class.
Late homework policy: There is a grace period of one day past the formal due date for each homework. You will receive 0 credit on any homework submission past this point.
Discussion about the course material and homework problems is encouraged, but you should work on the problems on you own.
Homework will not be graded.

All homework should be submitted to ***Gradescope***; First, make a pdf scan of your written work from your phone's camera with a scanning app like CamScanner and create a pdf (**photo files are not acceptable**). Then upload your pdf to Gradescope through the link in the Canvas assignment area before the due date. In Gradescope, you should link the pages of your answer to the corresponding questions. Please watch this video to get familiar with using it.

Term Project:
One term project will be given in early November and due before Thanksgiving break.

Exams:
There will be three midterms (in class, closed books)
The final exam will cover all the knowledge throughout the semester.

Strategy for both HW and exams:
Clear demonstrations of your understanding of the problems.
For example, show clearly that:
Here are the assumptions,
Here are the relations between known and unknown.

Don’t be stuck on specific numbers.

Grading:
HW: 10%
Three Midterm: 17% x 3= 51%
Term Project: 15%
Final exam: 24%

Final Letter Grades:

A: 100-88 **B:** 87-75 **C:** 74-62 **D:** 61-50

Important Dates:

9/15/2025	first midterm exam
10/13/2025	second midterm exam
11/3/2025	third midterm exam
11/5/2025	release of term project
11/24/2025	term project due
12/5/2025	final exam (Section B: 11:20 am - 2:10 pm; Section C: 8:00 am – 10:50 am)

Georgia Tech School of Aerospace Engineering Values

Integrity

I achieve excellence by embodying the highest ethical standards and communicating openly, authentically, and with humility.

Respect

I extend courtesy to everyone and promote a culture of inclusion, fairness, and equity.

Community

I am a global citizen and celebrate our collective achievements and contributions to the world around us.

Accountability

I take ownership of my actions and value the responsibility to honor public trust.

Adaptability

I embrace change as a path to progress, success, and innovation.

Discussion Points

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: http://policylibrary.gatech.edu/student-affairs/academic-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: https://gatech.instructure.com/courses/108574

   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, & Ed. (CARE): https://care.gatech.edu/ 404.894.3498 (Counselor On-Call)

   Counseling Center: https://counseling.gatech.edu/ 404.894.2575

   Stamps Health Services: https://health.gatech.edu/ 404.894.1420

Student Life and Dean of Students: https://studentlife.gatech.edu/content/get-help-now 404.894.6367

Victim-Survivor Support (VOICE): https://healthinitiatives.gatech.edu/well-being/voice 404-385-4464/(or 4451)

National Suicide Prevention Lifeline: 1.800.273.TALK (8255)

Georgia Crisis and Access Line: 1.800.715.4225

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.

   http://policylibrary.gatech.edu/equal-opportunity-nondiscrimination-and-anti-harassment-policy