

AE 2010 - Thermodynamics and Fluids Fundamentals

Fall 2026

Hours: 4-0-4

Instructor Information

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General Course Information

Description

Thermodynamic and fluid properties. Conservation laws. Isentropic flow, shocks and expansions, introduction to flows with friction and heat transfer. Applications to aerospace devices.

Course Learning Outcomes

Students will gain a master level understanding of:

1. Properties of fluids (temperature, density, pressure, viscosity, speed of sound)
2. Thermodynamic properties and state equations (including gases, incompressible substances and two-phase mixtures)
3. Basic concepts of thermodynamics (systems, work, heat)
4. 1st and 2nd Laws
5. Application of conservation equations (integral and differential forms) to fluid mechanical and energy conversion devices
6. Static and stagnation Properties
7. Propagation of and property variation due to disturbances (Mach, shock, compressions, and expansions)
8. Quasi 1D analysis of compressible internal flows
9. Bernoulli equation, hydrostatics, streamlines
10. Physical characteristics and similarity parameters associated with continuum flow regimes
(subsonic, transonic, supersonic, hypersonic, steady, unsteady, viscous, inviscid)

Students will gain a basic level understanding of:

11. Derivation of the basic conservation equations for thermodynamics and fluid mechanics

Students will gain an exposure level understanding of:

12. Relevant applications to aerospace systems

Required Course Materials

- Steven R. Turns, Thermodynamics: Concepts and Applications, 2nd ed.
- John D. Anderson, Fundamentals of Aerodynamics, 6th ed.
- Course lecture notes

Grading Policy:

Graded Components

Assignment	Weight (%)
Homework	30%
Mid-term exam 1	20%
Mid-term exam 2	20%
Final Exam	30%

Homeworks will generally be assigned on a weekly basis and must be turned in on time. Assignments will be posted on Gradescope and Canvas and submissions will be due on Gradescope (pdf file upload).

Grading Scale

Final grades will be assigned as a letter grade according to the following scale:

Letter Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

All grades are final. Unless an error has been made in grading the exam/assignment, no additional partial credit will be given. The offering of extra credit is at the instructor's discretion.

Course Policies

Attendance and/or Participation

Consistent class attendance is **strongly encouraged** - regular attendance and participation will significantly enhance your learning experience.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

AI Policy

Using generative AI tools in the graded work of the course is not allowed. The use of such tools for graded work will be considered a serious infraction of the Georgia Tech Honor Code subject to investigation by the Office of Student Integrity.

Core IMPACTS

[Core IMPACTS](#) is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated [career competencies](#). [This resource](#) developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and

cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Pre- &/or Co-Requisites

- MATH 2401 Minimum Grade of C / MATH 2411 Minimum Grade of C / MATH 24X1 Minimum Grade of T / MATH 2551 Minimum Grade of C / MATH 2561 Minimum Grade of C / MATH 2X51 Minimum Grade of T
- PHYS 2211 Minimum Grade of C / PHYS 2231 Minimum Grade of C
- CHEM 1310 Minimum Grade of C / CHEM 1211K Minimum Grade of C

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Students may receive a **short extension (2 days) on a maximum of 3 assignments without penalty**; all other late submissions will receive points deductions.

Students with conflicts or Institute-approved absences should contact the instructor individually and **as soon as the conflict/approved absence is known**. Emergency situations should be communicated immediately to the instructor.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

- Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A [comprehensive list](#) of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being ([student-resource-guide \(gatech.edu\)](#))