

ME 4321 Syllabus

Refrigeration and Air Conditioning, Section A, 3 credits

Fall 2026

Instructor Information

Instructor: Comas Haynes

Email: comas.haynes@gtri.gatech.edu

General Course Information

Description

This is a course emphasizing the thermal science and technology basis of heating, ventilating, air conditioning, and refrigeration (HVAC/R). Traditional basics as well as trending topics (*e.g., heightened ventilation sensitivity given recent pandemic concerns; heightened attention upon energy efficiency and decarbonization measures given added global warming concerns*) will be covered. **As viable**, we will incorporate some actual observations and tours of working systems and facilities.

Finally, principles, practices, and conceptual design/enhancement of HVAC/R systems used to control the indoor thermal environment **for comfort and health are explicitly covered; however, there is anticipated leverage for other related sectors such as data centers thermal management.**

Course Learning Outcomes

*Upon successful completion of this course, students should be able to graphically depict both the process flowsheets and thermodynamic representations of prevalent HVAC/R systems/approaches (*e.g., equilibrium diagrams, psychrometric graphs, flow systems analysis*), as well as perform introductory thermal systems analyses with such.

*Upon successful completion of this course, students should be able to comprehend and analyze driving factors for HVAC/R design (*e.g., sources of heat/cooling loads, ventilation requirements*).

*Upon successful completion of this course, students should be able to comprehend and have some “fluency” in traditional and state-of-the-art approaches to HVAC/R design (e.g., system performance metrics, graphical methods, long-existing standards, emerging practices).

*Upon successful completion of this course, students should be able to identify and quantify energy efficiency opportunities within HVAC/R systems.

*Upon successful completion of this course, students should be able to appreciate leverage opportunities beyond HVAC/R for comfort/health (e.g., data centers thermal management).

Required Course Materials

A **tentatively suggested** text is *HVAC Simplified* by S. P. Kavanaugh, 2005, **but do not buy the reference at this time**. Any text requirement will be finalized before the course begins. Additionally, online resources and class resources may factor.

Grading Policy:

Evaluation Methods: *Students are responsible for text chapters **and** lecture notes*

1. **“Pop”** quizzes, based on class lecture and homework examples: 20%
2. Exams: 30%
3. Conceptual design/analysis project: 20%
4. Final exam: 30%

Grading Scale:

A: 88% - 100%

B: 76% - 87%

C: 64% - 75%

D: 52% - 63%

F: < 51.9%

Description of Graded Components

*The **“pop” quizzes** will be previously unannounced and periodic in nature. They will be relatively brief in nature and are meant to reward students that consistently come and invest themselves in course content and activities. They also represent a buffer against the full weight of in-class evaluation solely being upon exams; as they will be significantly smaller

in length and less taxing in nature. **The key is to remain engaged with the class throughout the term.**

Excused absences (e.g., medical situations, unavoidable and pre-approved schedule conflicts) will exempt one from a missed quiz. There also may be a provision for ****at least**** one unexcused quiz to be dropped. If, however, the dropped quiz results in an insufficient number of quizzes to be averaged for a given student (e.g, in combination with excused absences), the instructor will have to determine what's most appropriate for that student.

*Two “regular” **exams** are anticipated, with each having equal weight (i.e., 15% each). Extensive exam guides are given well before exam dates.

*The **conceptual design/analysis project** will be introduced later in the course. It will not be a full-term exercise, but shorter in duration and expected delivery content. It is meant to preliminarily exercise some design considerations based upon core content that is learned.

*The **final exam** is generally comprehensive, and, as with exams, extensive exam guides will be given well before exam dates.

** Assigned **homework** is not explicitly weighted, but it can assist preparation for in-class evaluations (e.g., quizzes and exams). Homework is collected/graded. A poor homework average will not explicitly lower one's overall grade; however, a high average may aid “borderline” final grade cases.

Course Policies

Attendance and/or Participation

Routine attendance is expected as a part of the educational experience. The pop quizzes are a part of that expectation. Infrequent absences due to extenuating circumstances (e.g., illness, unavoidable schedule conflicts due to off-campus interviews) will be handled with fairness on a case-by-case basis.

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.

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.