

AE 6451 - Syllabus

Electric Propulsion AE 6451, 3 Credits

Fall 2026

Instructor Information

Instructor: Dan Lev

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General Course Information

Description

The course provides a solid background of the operating principles, performance characteristics, and design features of the state-of-the-art electric propulsion technologies.

Course Goals and Learning Outcomes

The course aims at providing the students with an overview of electric propulsion systems with the main focus placed on engineering issues and thruster performance. On completion of the course students should be able to:

- Understand various types of electric propulsion concepts.
- Describe the principal design and operating characteristics of electric engines and explain how these are related to thruster performance.
- List the main components of electric propulsion system.
- Perform basic analysis of thruster performance and efficiency.
- Be familiar with the mechanical design of typical electric thrusters.

Topics Covered

Introduction

Performance Parameters

Single Particle Motion in EM Fields

Introduction to Plasma Physics

Introduction to Plasma Physics (Cont'd)

Conductivity and Current in Ionized Gases

Ion Engines

Hall Thrusters

Electrostatics Vs. Electromagnetic Acceleration

MagnetoPlasmaDynamic Thrusters (Cont'd)

Pulsed Plasma Thrusters

Plasma Diagnostics

Required Course Materials

Textbooks

Plasma Physics and Controlled Fusion, Volume 1: Plasma Physics
Francis F. Chen, 1983

Fundamentals of Electric Propulsion: Ion and Hall Thrusters
Dan M. Goebel & Ira Katz, 2008

Physics of Electric Propulsion
Robert G. Jahn, 2006 (1966 originally)

Course notes

All course presentations will be posted via Canvas prior to the respective class. All course notes will be in PowerPoint or PDF formats. Students are encouraged to review the class notes before each class.

Grading Policy

25% - HW sets

20% - Project

55% - Final Exam

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

Description of Graded Components

A-section students (In-Class): The final exam is in class and open book and notes.

Q-section students (Distant Learning): The final exam is proctored by *Honorlock* (AI proctor).

Course Policies

Attendance and/or Participation

In-class attendance is not required but recommended.
This will be an active classroom, where you will be expected to participate.

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.

Pre- &/or Co-Requisites

AE 4451 (Jet and Rocket Propulsion)

Collaboration, Group Work, and Use of Generative AI

You are allowed to work in groups on all homework and out-of-class assignments, but any work you turn in must be written in your own hand or by you using your computer. The final exams is to be your own work.

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

Late homework will be penalized. Make-up exam is given for illness, approved Institute activities or religious observances.