AE 6451 - Syllabus

Electric Propulsion. 3 Credit Hours.

General 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.

Pre- &/or Co-Requisites

AE 4451 (Jet and Rocket Propulsion)

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.

Course Requirements & Grading

Note: Graded components of a course may vary with each offering. The example below is typical but subject to change.

Description of Graded Components

25% - HW sets, 20% - Project, 55% - Final Exam

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

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

Topics Covered

Note: The exact topics covered in a course may vary with each offering. The example below is typical but subject to change.

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
Hall Thrusters (Cont'd)
Hall Thrusters (Cont'd)
ES Vs. EM Acceleration + MPD Thrusters
MPD (Cont'd)
Plasma Diagnostics

Course Materials

Note: Course materials may vary with each offering. The example below is typical but subject to change.

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.