

# ENAE 663: Intro to Plasmas for Space Propulsion & Power

## Spring 2014 Course Syllabus

**Instructor:** Prof. Raymond Sedwick  
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**Credits:** 3  
**Prereqs:** PHYS 411  
Permission of Instructor

**Meeting times:** Wed 4-6:30 (for now)      **Location:** EGR0108 (for now)

**Office Hours:** By Appointment

### Textbooks

There are no texts assigned for the course. Any standard text from the library on introductory plasma physics will describe the physical phenomena to be discussed.

### Course Objectives

This course is a prerequisite for ENAE 667, Advanced Space Propulsion and Power (Fall 2012). While the focus of ENAE 667 will be the operation and performance of a variety of technologies, the focus of ENAE 663 is on the fundamental physical concepts and mathematics used in their analysis.

### Topics Covered

Characteristics of plasmas, Motion of charged particles in fields, Collisional processes, Kinetic theory, Fluid description of plasmas, Transport properties, Equilibrium vs. Non-equilibrium, Creation of plasmas.

### Learning Outcomes

After taking this course, students will be able to:

1. Explain the origin of and quantify particle drifts in electromagnetic fields
2. Describe the numerous length and time scales associated with plasmas
3. Manipulate and utilize velocity distributions in different coordinates
4. Describe and quantify collisional and relaxation processes in a plasma
5. Derive the dispersion relations for different types of waves in plasmas
6. Understand when and how to model plasmas as fluids

### Grading

Grades will be based on homework assignments (50%), exams (40%), and attendance/class participation (10%). Collaboration on homework is encouraged, however the final work turned in must be your own. Homework is due at the beginning of class.

### Course Schedule

The course schedule will consist of 16 lecture periods. Exams will either be oral (individually scheduled for outside of class) or take-home. There is no final exam.