

## Contact Information

Instructor: Jim Crumley  
Office: 107 Peter Engel Science Center  
Email: [jcrumley@csbsju.edu](mailto:jcrumley@csbsju.edu)  
Phone: 363-3183  
Office Hour: 1 pm odd days (or by appointment or just stop by)

## Course Information

Lecture: 8:00–9:10 am Days 246  
Room: 167 Peter Engel Science Center  
Textbook: *Introduction to Space Physics* – Edited by Kivelson and Russell  
Web Site: <http://www.physics.csbsju.edu/364/>

## Introduction

Space Physics is the study of what goes on in the solar systems between the Sun and its satellites — the planets, moons, comets, asteroids, etc. In elementary science classes this region is often described as vacuum that contains no matter. This is an exaggeration — even though the number density of particles in most regions of the solar system is small enough to be considered a vacuum by earthbound standards, matter still exists in all regions. This matter usually exists as a plasma. Along with the plasma, many different types of waves exist in space. Much of this course will deal with the plasma and waves in space and their interactions with each other.

In some ways, Space Physics is one of the oldest branches of physics. Since before recorded history, people have been fascinated by the night sky. Much of what interested ancient people involved the stars, which would now be classified as astronomy, but some of the most striking phenomena, including most importantly the aurora borealis and australis, have their roots in Space Physics. Though Space Physics has its roots in the distant past, it did not really come into its own as a field of study until after man-made satellites were first launched into space. In-situ measurements are key to understanding the space environment and in this course we will often look at spacecraft data.

## Course Outline

1. Historical Overview – Chapter 1
2. Plasma Physics Intro – Chapter 2
3. The Solar Atmosphere – Chapter 3
4. The Solar Wind – Chapter 4
5. The Earth's Magnetosphere – Chapter 6/10
6. The Aurora – Chapter 14

## 7. Space Weather – Chapter 13

### Tests

There will be one midterm for this class, tentatively scheduled for November 17. There will also be a final test, which is scheduled to be 11:00-1:00 on December 19.

### Homework Assignments

Homework will be assigned roughly once a cycle and be due roughly a cycle later.

### Grading

The grade in this class will be 40 % from the total homework grade, 20 % from the first test grade, and 40 % from the final test.

### References

- *Basic Space Plasma Physics* by Baumjohann and Treuman
- *Introduction to Plasma Physics* by Chen
- *Space Physics* by Kalleronde
- *Physics of Space Plasmas* by Parks