

AS 783: IONOSPHERES
COURSE PROSPECTUS – FALL 1998

Scope: The formation of the ionosphere. The structure and dynamics of the ionosphere and thermosphere. Aeronomy. Thermosphere/ionosphere coupling. Ionospheric electric fields and current systems. Ionospheric storms. Ionospheric waves and irregularities. Active experiments in space. Radio and optical ionospheric diagnostics.
(4 Credits; Prereq: consent of instructor)

Instructor: Michael Mendillo, Professor of Astronomy

Lectures: Tuesdays and Thursdays 2:00-3:30PM, CAS 500, with additional meetings to be scheduled

Texts: (1) Required: *The Earth's Ionosphere: Plasma Physics and Electrodynamics* by Michael C. Kelley; Academic Press, 1989
The Solar-Terrestrial Environment – by J.K. Hargreaves; Cambridge Press, 1992
(2) Basic References: Rishbeth and Garriott (1969) – *Introduction to Ionospheric Physics*
Banks and Kockharts (1973) – *Aeronomy*
Carovillano and Forbes (1983) – *Solar-Terrestrial Physics*
--All of the above books are on the Reserve Shelf in the Astronomy Library--

Course Schedule/Philosophy: In the first half, basic ionospheric processes will be reviewed with a term project assigned to provide in-depth, computational experience (references are Hargreaves, Rishbeth & Garriott, Banks & Kockharts, and Kelley).

In the second half of the course, Chapters 3 through 8 of Kelley's book will be covered (in varying amounts of in-class detail).

Grades: A series of homework assignments will be given and a term project assigned, results of which are to be presented in a "Poster Session" at semester's end.

Topics

1. Ionization Processes
2. Loss Processes
3. Transport Processes
4. Ionospheric Models: The Continuity Equation
5. Thermal Processes
6. The Plasmasphere
7. Optical Processes
8. Ionospheric Measurement Techniques
9. Ionospheric Morphology
10. Ionospheric Storms
11. Electrodynamics and Instabilities in the Equatorial Zone
12. Electrodynamics and Instabilities in the Mid-Latitude Region
13. Electrodynamics and Instabilities in the High-Latitude Domain