# AST 381 ASTROPHYSICS OF GASEOUS NEBULAE

Fall 2008: MWF 11-12, RLM 15.216B

INSTRUCTOR: Prof. Gregory Shields


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SUBJECT: Physics of emission-line nebulae, including ionization and thermal equilibrium, optical, infrared, and X-ray emission, spectral diagnostics, and dynamics. Applications to Galactic nebulae, novae, supernova remnants, active galaxies, and the early universe. Introduction to the CLOUDY photoionization code.

TEXTBOOK: Osterbrock & Ferland, *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei,* 2nd edition (University Science Books, ISBN 1-891389-34-3). Table of contents and errata at http://www.uscibooks.com.

GRADING: Based on 2 closed book exams, homework, class participation, and journal talk.

20% Exam 1
30% Exam 2
40% Homework
10% Participation and journal talks

HOMEWORK: To be written up and handed in one week after assignment. Solutions will be provided after assignment is handed in.

TALKS: Each student will give a 10-minute review talk (plus five minutes discussion) on a recent journal article.

## MOTIVATION

Ionized plasmas play an important role in many aspects of astrophysics. H II regions and planetary nebulae, ionized by hot stars, provide opportunities to measure chemical abundances and other quantities that tie into the subjects of star formation, stellar evolution, and the chemical evolution of galaxies. The physics of ionization, recombination, and emission apply to many other topics, including stellar envelopes, nova shells, supernova remnants, the interstellar medium, active galaxies, intergalactic gas, and primordial star formation. Nebular studies include the roles of dust and hydrodynamics. A fundamental understanding of physical processes in ionized nebulae provides the student with tools having broad application to forefront topics in modern astrophysics.

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