

AS757: High-Energy Astrophysics – Syllabus

Spring Semester 2017

Classes: TR 2-3:15, room CAS 502

Instructor: Professor Alan Marscher, Department of Astronomy

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Course Description:

High-energy astrophysics refers to cosmic phenomena involving X-ray and/or γ -ray photons, particles with relativistic energies, and/or plasmas with temperatures exceeding 10^6 K. Such phenomena are common throughout the universe, from the Sun and heliosphere to galaxy clusters and the jets of quasars. Scientific descriptions of high-energy phenomena require the formulations of Relativity, non-thermal radiative processes, dynamics of magnetic fields, shock waves, and the behavior of energetic particles. The course will cover these topics and apply them to the interpretation of observations.

The classes will entail roughly 50% presentation/discussion of concepts and phenomena led by the instructor, and about 50% discussion, with the instructor as moderator, of assigned problems drawn from research topics. The goal is to increase the students' general research competence as well as knowledge of high-energy phenomena and processes. This will require reading of the textbook and supplementary material, as well as thinking through the approach and solution to the problems, before each class.

Textbook

The textbook for the course is *High-Energy Astrophysics* by Fulvio Melia. Material from Malcolm Longair's book of the same title will be used for topics on which the coverage of Melia's book is too light.

Grading

Grades will be based on classroom performance in the analysis and solution of the assigned problems.