TIME & PLACE: Monday / Wednesday / Friday at 10:00am in Duane E126

INSTRUCTOR: Phil Armitage (pja@jilau1.colorado.edu; office JILA A909; office phone 2-7836). There are no official `office hours’ for this class – I’m normally in the office afternoons / early evenings (2-6pm) and you’re welcome to stop by at any time. Email or call if you want to be certain I’m around.

AIMS: The primary goal of this course is to understand the radiation from astronomical objects – how it’s produced and what it can tell us about the physical conditions of gas in nebulae and at the surfaces of stars, planets, accretion disks etc.

OUTLINE: Topics to be covered in the class include

- Review of quantum mechanics – the Schrodinger equation, operators, angular momentum, perturbation theory
- Hydrogen-like atoms and their spectroscopy
- Subtleties of hydrogen – spin, fine and hyperfine structure, Zeeman splitting
- Multi-electron spectroscopy, L-S coupling, selection rules, different types of transitions
- Ionization, excitation, and radiative cooling
- Introduction to radiative transfer
- Opacities
- Spectral line profiles
- Molecular physics
- Statistical mechanics and quantum statistics

The focus will be on non-relativistic processes – topics such as inverse Compton and synchrotron radiation will be covered in IP2 and / or high energy classes for those interested.

TEXTBOOKS: The ‘required’ textbooks for this course are Radiative Processes in Astrophysics by George Rybicki and Alan Lightman, and Statistical Mechanics by R. Pathria. Since we won’t follow either text to any significant degree, I wouldn’t rush out to buy these, though Rybicki and Lightman especially is a useful reference to have eventually.

GRADING: Grades will be based upon

- Problem sets – 50%
- A take-home midterm – 20%, to be attempted independently
- A final presentation – 30%, done either individually or in a group of 2

I reserve the option to award a small amount of extra credit (up to 5%) for class participation above and beyond what’s normal.
**QUERIES:** Questions and discussion in class are welcome – the more the merrier! Likewise please let me know if particular topics prove to be too hard (or, too easy) – there’s no absolute list of topics we have to cover and I’d much prefer you gain a firm grasp of a more limited set of skills than a hazy idea of everything.