

Astronomy 383C

Stellar Atmospheres

Spring 2005 — Unique Number 46855

Meetings:

MWF, 1:00 PM — 1:50 PM, in RLM 15.216B

Instructor:

Chris Sneden, RLM 15.310A (normally enter 15.312)

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office hours: MWF, 2:00 PM — 3:00 PM

Text:

None!

Recommended: D. F. Gray, *The Observation and Analysis of Stellar Photospheres*

Suggested: G. W. Collins, *The Fundamentals of Stellar Astrophysics*

Suggested: W. K. Rose, *Advanced Stellar Astrophysics*

Suggested: C. R. Cowley, *The Theory of Stellar Spectra*

Grading:

out-of-class assignments 60% of grade

Hour tests (2 of them) 40%

Subject Matter, Goals, and Miscellaneous Comments

Astronomy 383C is a graduate-level course on stellar atmospheres. The official course description is broad: “Observational properties of stellar atmospheres; theoretical calculations of stellar atmospheres and stellar spectra.” The prerequisites for AST 383C are graduate standing and consent of instructor. I will assume that you have had AST 380E *Radiative Processes and Radiative Transfer*, so that we can plunge into the stellar atmospheres material pretty quickly.

My bias in this course? I regard AST 383C as one link between the basic, often elegant physics that you have ingested, and the real, often messy world of stellar astronomical research. The assignments will not tax your mathematical abilities. I am not an astrophysicist as the term is usually meant (that is, I am not a theorist). I am an observational

astronomer, and proud of it. Thus the stellar atmospheres work in this course will have a strong observational bias to it. This can be seen in the suggested books, which do not include (as a prominent example) the very theoretical *Stellar Atmospheres, 2nd Edition* by Mihalas. It can also be understood by some of the assignments to be worked on: investigations of photometric systems, derivation of the chemical compositions of stars, the computations of model stellar atmospheres, etc. Since this is my first time to teach this course, I am unsure of the pacing, and the topics to be covered are therefore not assigned time-lines in the list below.

Preliminary Wimpy Course Outline (subject to revision)

1. Reminders of Basic Quantities of Radiation: intensity, flux, blackbodies
2. Overview of Large-Scale Observational Properties of Stars: luminosity, effective temperature, color indices, “classification” spectroscopy, the Hertzsprung-Russell diagram, stellar masses
3. Radiative transfer as applied to stellar atmospheres
4. Basic principles of model atmosphere construction
5. Photospheric spectral line formation
6. Chemical composition analysis
7. Stellar winds; mass loss