

CSI 661 / ASTR 530
Astrophysics
Syllabus

Spring 2011

Prerequisites: PHYS 303 (Classical Mechanics), PHYS 305 (Electromagnetic Theory), PHYS 308 (Modern Physics with Applications); MATH 214 (Elementary Differential Equations)

Credits: 3

Data and Time: 4:30 PM to 7:10 PM, Wednesday

Location: Room 302, Research Building I

Instructor: Prof. Jie Zhang

Contact Info: (703)993-1998 (phone), jzhang7@gmu.edu (e-mail)

Office Hour: 3:00 PM to 4:00 PM, Wednesday, or by appointment

Office: Room 351, Research Bldg 1

Description: The general purpose of this course is a survey of contemporary astrophysics. Topics include physical concepts, stellar spectra, Hertzsprung-Russell diagram, stellar atmospheres, stellar structure, interstellar matter, stellar evolution, high-energy phenomena, hydrodynamical processes in astrophysics, accretion disk formation, and shock formation. In this semester, the class will focus on stellar structure and evolution, and stellar atmosphere.

Content:

- Overview of Stellar Evolution
- Preliminary Physical Processes
- Equations of State
- Radiative and Conductive Heat Transfer
- Convective Heat Transfer
- Stellar Energy Sources
- Stellar Modeling
- Structure and Evolution of the Sun
- Stellar Atmosphere: the Background
- Spectroscopic Tools
- Model Photosphere

Homework: There will be weekly assignment of homework. Each homework consists of 2 to 5 questions.

Project: There will be one project, which is to use the numerical method to solve the physical equations, in order to fully model the structure of the star of a given mass. Students are expected to make an oral presentation on the results of the project.

Exams: There will be one midterm and one final exam.

Grades: Homework (25%), Project (25%), Midterm (20%), Final Exam (30%)

Class URL: http://solar.gmu.edu/teaching/2011_CSI661/

Text Book (required): "Physical Principles, Structure and Evolution". by C.J. Hansen, S.D. Kawaler and V. Trimble, 2nd edition, Springer-Verlag, 2004. ISBN 978-0-387-20089-7

Supplement Reference Books:

- "Stellar Atmosphere: The Observation and Analysis of Stellar Photospheres". By David F. Gray. Third Edition, Cambridge Press, 2005. ISBN 0-521-06681-6