COURSE: Astronomy 591, “STELLAR STRUCTURE & EVOLUTION”
Tuesdays & Thursdays 9:30am - 10:45am, CP 287

INSTRUCTOR: Prof. Isaac Shlosman
Office - CP289 (phone 257-3461)
Office Hours – Mondays, Wednesdays, 4:00 to 5:00pm
I am flexible: easily found in my office and answer emails
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Course homepage on the web:
http://www.pa.uky.edu/~shlosman/591.html

TEXTBOOK:
1. Stellar Interiors: Physical Principles, Structure and Evolution,
   2nd edition by C.J. Hansen, S.D. Kawaler & V. Trimble (Springer),
   2004 (recommended)
2. Lecture notes and suggested material
3. Additional recommended books:
   Principles of Stellar Evolution and Nucleosynthesis by D. Clayton
   (Chicago: Univ. of Chicago) 1968, 1984
   Stellar Structure and Evolution by R. Kippenhahn and A. Weigert
   (Berlin: Springer) 1994. This is an excellent reference book
   Structure and Evolution of the Stars by M. Schwarzschild
   An Introduction to the Theory of Stellar Structure and Evolution by
   Dina Prialnik (Cambridge University Press) 2000. It is at a lower
   level than the others, but has an excellent physical description

COURSE DESCRIPTION & OBJECTIVES: This course will deal with the basic physics
of stellar interiors and stellar evolution. It is designed to introduce the theory of stellar
structure to beginning graduate or upper level undergraduate students, emphasizing the
basic underlying physics. The course will include elements of the statistical physics, a
discussion of the stellar structure equations, and an introduction into how the equations are
solved. We will also look at the basics of stellar atmospheres as well as include an introduc-
tion to more exotic phenomena, including stellar pulsation, binary evolution and accretion
disks in binary systems. Although this is a theoretical course, the latest observational
results will be used to supplement the physical modeling.

COURSE EVALUATIONS: Course evaluations are an important (and mandatory!) com-
ponent of our Department’s instructional program. The evaluation window for Spring 2016
will open 4/4 and close 4/24. To access the system, simply go the Department of Physics
Web page at www.pa.uky.edu and click on the link for Course Evaluations; then follow the
instructions. You will need to use your student ID# to log into the system, and this will
also allow us to monitor who has filled out evaluations. However, when you log-in you will be assigned a random number that will keep all your comments and scores anonymous.

COURSE REQUIREMENT: Problem sets will be usually distributed to students on Thursdays. These problem sets must be handled in on time (next Tuesday) and must reflect student’s own work. Graduate students will be judged on a deeper understanding of the subject. In addition, each student will make a presentation on a contemporary topic in stellar astrophysics from a provided list. This will be a general review, but at least one specific question must be reviewed in depth. The list of suggested topics will be posted on the course website in February.

TESTS: There will be no exams in this class. The student will be evaluated based on his/her homework, in-class participation, and a seminar presentation in class.

GRADES: The final letter grade in this course will be determined by your scores from the Problem Sets (50%), the Seminar Talk (40%), and a class participation (10%). The seminar will include an in-class lecture by each student on an assigned topic (depending on the number of students, for about 50 min – 1 hour.). The letter scores are defined as: A (89-100%), B (76-88%), C (63-75%), D (50-62%) and E (49% and less). The passing score for graduate students is C and for undergraduate students is D.

SERVICES OF THE TEACHING ASSISTANT: NONE. However the students are welcomed to discuss any subject of interest with the instructor.

COURSE OUTLINE (may be re-shuffled!):
1. Introduction to Cosmology
2. Stars and basic properties of matter
3. Observational characteristics of stars
4. Hydrostatic equilibrium
5. Radiative transfer
6. Stellar opacity
7. Introduction to stellar evolution
8. Main sequence stars
9. Post-main-sequence evolution
10. Advanced stages of stellar evolution
11. End products of stellar evolution: the compact objects
12. Star formation
13. Binary stellar evolution
14. Accretion disks in stellar systems