

COURSE: GALACTIC DYNAMICS and THE ISM

Wednesdays 2:00pm – 5:00pm

Course homepage on the web:

<http://www.pa.uky.edu/~shlosman/OSAKA/>**INSTRUCTOR: Professor Isaac Shlosman**

Office – F 611

Office Hours – anytime when I am in my office

I am flexible: easily found in my office and answer emails

e-mail: shlosman@pa.uky.edu

TEXTBOOKS: 1. Galactic Dynamicsby J. Binney & S. Tremaine (Princeton Univ. Press), 2nd edition,
recommended**2. Galactic Astronomy**by J. Binney & M. Merrifield (Princeton Univ. Press),
recommended

COURSE DESCRIPTION & OBJECTIVES: This course will deal with the basic physics of interstellar medium, and stellar- and gas-dynamics. Although this is a theoretical course, the latest observational results will be used to supplement the physical modeling.

COURSE REQUIREMENT: Problem sets will be usually distributed to students in class. These problem sets must be handled in on time (next Wednesday) and must reflect student's own work. Discussing the homework and collaborating with the fellow students is acceptable, but the turned-in solutions must display independent work. Moreover, you are encouraged to work on the course material with other students, but remember that you will be graded on your own work.

TEXTBOOKS: The students are warned that no single textbook covers all the material of this course in sufficient depth, but the recommended books do it best. Additional information is scattered in different monographies and journal review papers. The main source of information will be the lecture notes and the recommended textbooks. Other useful references:

- Bertin, *Dynamics of Galaxies*, 2000
- Elmegreen, *Galaxies and Galactic Structure*, 1998
- Mihalas & Binney, *Galactic Astronomy*, 1982 (old!)
- Pagel, *Nucleosynthesis and Chemical Evolution of Galaxies*, 1997

GRADES: The final letter grade in this course will be determined by your scores from the *Problem Sets* (80%), and class attendance (20%). The letter scores are defined as: A (89-100%), B (76-88%), C (63-75%) and E (62% and less). C is the passing score.

COURSE OUTLINE: This course will deal with four major issues: (1) basic phenomenology of galaxies, (2) mechanics of internal motion in galaxies, (3) stability of structural components in galaxies (disks and spheroids), and (4) galaxy formation and evolution. The goal is to show that our theoretical understanding of galactic systems is supported by the present observational data.

- Overview
- Galactic Morphologies and Classification
- Potential Theory
- Stellar Dynamics: Collective Phenomena and Two-Body Relaxation
- Structural Laws for Disks and Spheroids
- Physical Processes in the Multiphase Interstellar Medium (ISM)
- Dynamics of the ISM
- Dynamics of Galactic Disks: Spiral Structure and Stellar Bars
- Galaxies in the Cosmological Context