

## Ay 401/501 CELESTIAL MECHANICS—GALAXY DYNAMICS MWF 11:00–11:50am

**Office Location and Hours:** Dr. Byrd—Room 306 Gallalee Hall (Physics) Phone 348-3793. I am usually in during regular working hours except for colloquia after 2:00 p.m. on Wednesday and Friday afternoons. Make or call for an appointment to be sure I will be there.

**Course Content:** Since this is a hybrid graduate/undergraduate course, we will start with basic material and consume some time in review. Hopefully, the subject matter of these portions will be seen from a sufficiently different viewpoint and conducted at an appropriate pace so all students will benefit. The entire scope of the subject will be touched on from the dynamics of space probes and solar system objects through stars and star clusters ending with the dynamics of galaxies and galaxy clusters. Use of computer calculations and simulations will be included.

**Attendance:** Since material not in the texts will be covered in lecture, regular attendance is very important although roll will not be taken.

**Homework:** Assignments will usually be short problems or computer programs for all students. For the graduate students, additional review papers, lectures or projects will be assigned individually.

**Examinations:** Two tests and a non-comprehensive final will be given with the tests scheduled during the semester depending on the class's progress. Each exam will be composed of two parts. The first **in-class** portion will be closed book and will require memorization and understanding of fundamental principles and formulae. The second portion will be **open-book** composed of more complicated problems testing understanding and use of course content by the student. Please contact me beforehand or as soon as possible after missing an exam to arrange a make-up. The **final exam** is scheduled for Saturday May 11 from 8:00 to 10:30 a.m. in Room 204. We will discuss maybe starting at 9:00 am instead.

**Course Grade:** For graduate students, the grade will be computed from the test grade average, the home work and the project weighted at approximately 0.6, 0.1, 0.3 respectively. For undergraduates, the test average and the homework will determine the course grade with weighting of approximately 0.7 and 0.3, respectively.

### Texts and Other References:

*Fundamentals of Celestial Mechanics* by J.M.A. Danby (Wilmann-Bell, pub.) Paper back edition.

*Galactic Dynamics* by Binney and Tremaine (Princeton, publisher)

Both the above are good and not too expensive. Buy both. The first will cover the first part of the course. The second, the latter part of the course.

Other useful references are:

*Gravitational Physics of Stellar and Galactic Systems* by Saslaw. A deep textbook. Very good reading but more expensive than *Galactic Dynamics*.

*Practical Astronomy with Your Calculator* and *Astronomy with Your Personal Computer* by Duffett-Smith, Pub. by Cambridge U. Press. Very useful for calculator and computer. Cookbook version of some of material in Danby.

*Galaxies in the Universe* by L. S. Sparke and J. S. Gallagher, Cambridge, 2000. A very good senior/1st year graduate text with a lot of dynamics in it. Less mathematical than Binney and Tremaine.

*Methods of Celestial Mechanics* by Brouwer and Clemence (Academic Press, pub.) Detailed text from the time when astronomers viewed Celestial Mechanics as not “real astronomy” and celestial mechanics viewed astronomy as not “real science” and the IBM card was high-tech. Now, things have really changed. Hardly anyone knows what an IBM card is.

*Solar System Dynamics* by C. D. Murray and S. F. Dermott, Cambridge, 1999. A modern version of Brouwer and Clemence.

**To request disability accommodations,** please contact Disabilities Services (348-4285). After initial

arrangements are made with that office, contact me.