

DEPARTMENT OF PHYSICS

PHYSICS 162 – Galaxies & Cosmology

Spring 2005

INSTRUCTOR:

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TEACHING ASSISTANT:

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COURSE SCHEDULE:

Lectures: TTh 09:30 – 10:50am SERF 329
Problem Session (tent) T 1:00 – 2:00pm SERF 329

COURSE INFORMATION:

<http://cassfos02.ucsd.edu/physics/ph162>

COURSE DESCRIPTION: The structure and properties of normal galaxies, galaxy rotation and dynamics, dark matter, the extragalactic distance scale, cosmological models and observations, cosmic background radiation, inflationary cosmology. Physics 160, 161, 162 may be taken as a three quarter sequence for students interested in pursuing graduate study in astrophysics or individually as topics of interest. *Prerequisites: Physics 2 or 4 sequence or equivalent, upper division standing in physical science or engineering.*

COURSE TEXT/REFERENCES: Ryden, *Introduction to Cosmology* (Addison-Wesley, 2003) is the text for this course. It will be a couple of weeks before we get into the meat of this course so you have time to shop the web (try <http://www.bestbookdeal.com>) for a less expensive copy. Readings may also be assigned or suggested from time to time in books set aside on reserve in the S&E Library and CASS Marlar Libraries. Books that will be placed on reserve include:

Carroll & Ostlie	<i>Modern Astrophysics</i>	Addison Wesley
Elmegreen, D.	<i>Galaxies & Galactic Structure</i>	Prentice Hall
Kutner, M.	<i>Astronomy: A Physical Perspective</i>	Harper & Row
Peterson, B.	<i>Active Galactic Nuclei</i>	Cambridge
Rowan-Robinson, M.	<i>Cosmology</i>	Oxford
Sandage, A.	<i>The Hubble Atlas of Galaxies</i>	Carnegie Institution
Zeilek & Gregory	<i>Introductory Astronomy and Astrophysics</i>	Saunders

Of these, Carroll & Ostlie is a very good general astrophysics reference, but weak on extragalactic astrophysics. The books by Kutner and Zeilek & Gregory are good general references at a somewhat more phenomenological level than Carroll & Ostlie. Additional references will be placed on reserve as required.

In addition, there are shelves full of other texts or semi-popular books on various aspects of astronomy at the Undergraduate Library. Several magazines including *Scientific American*, *Science*, *Discover*, *Astronomy*, *Sky and Telescope*, and *Mercury* regularly carry articles relevant to the course material. If you have a particular question or problem, I will be happy to suggest suitable references. In addition, bibliographies of articles and references in various publications have been published from time to time in *Mercury* magazine. These may help provide a start in thinking about subjects for your Research Paper (see below).

TOPICS (Tentative):

29, 31 Mar	Galaxies:	Introduction, Classification & Global Properties	Ch. 1 2
5 Apr		Rotation/Dynamics; Dark Matter	Ch. 8
7 Apr		The Extragalactic Distance Scale	
12 Apr		A Primer on General Relativity	Ch.3
14, 19 Apr	Theoretical Cosmology	The Friedmann Equation	Ch. 4
21, 26, 28 Apr		Cosmological Models	Ch. 5 6
3, 5 May	Observational Cosmology	Cosmological Parameters	Ch. 7
10, 12 May	The Big Bang	Cosmological Backgrounds	Ch. 9
17, 19 May		Primordial Nucleosynthesis	Ch. 10
24, 26 May	Inflation		Ch. 11
31 May, 2 Jun	Structure Formation		Ch. 12

HOMEWORK: Problems and exercises will be assigned and collected approximately bi-weekly. These will be exercises designed to expand on material covered in lecture. In addition there will be two or three "lab exercises" which will be part of the homework grade. The first of these will be on "Galaxy Classification".

RESEARCH PAPER: A research paper on a topic relevant to the subject of this course will be due on *Thursday, May 26*. The paper should demonstrate knowledge beyond the level of the lectures in some area of extragalactic astrophysics and should use as primary reference material at least one significant paper in one of the relevant astrophysical journals. A list of 'hot topics' will be circulated or you may select a subject of your own choosing. I will ask you to submit a brief (one page *neatly* handwritten is acceptable) description of your proposed project to me by Thursday Apr 28. This will allow me to review your topic and to suggest appropriate reference material. I suggest that you restrict your subject to an area that can be described in detail in approximately 10 typewritten (double-spaced) pages. Papers should be typewritten and should list all reference materials used.

GRADING:

Grades will be calculated as follows:	Homework	60%
	Research Paper	<u>40%</u>