

Astrophysics and Cosmology through Problems (Fall 2008)

This course is aimed at advanced undergraduate and beginning graduate students, and is inspired by a book by the same title, written by Padmanabhan. Each session consists of solving one or two pre-determined problems, which is done by a randomly picked student. While the problems introduce various subjects in Astrophysics and Cosmology, they do not serve as replacement for standard courses in these subjects, and are rather aimed at educating students with hands-on *analytic/numerical* skills to attack new problems. Topics explored through these problems include:

1. Introduction to Astrophysics
 - (a) Basic Physics
 - (b) Newtonian Gravitational Dynamics
 - (c) Fluids and Radiation
2. General Relativity for Cosmology
3. Introduction to Cosmology
 - (a) The Homogeneous Universe
 - (b) Structure Formation
 - (c) Modern Topics: Inflation, Strings, etc.
4. Modern Cosmological Observations

Schedule/Location

We meet on Thursdays (Sep. 4- Dec. 18), 10-11:30 am and 12:30-2 pm in Alice room (3rd floor) at the Perimeter Institute.

Suggested texts are:

1. “Astrophysics and Cosmology through Problems”, by Thanu Padmanabhan
Although we may discuss some of the problems of this book at the class, this is really a self-study book, which we recommend the students to go through at their own pace.
2. “Physical Universe”, by Frank Shu
This is a classic and an excellent (albeit somewhat outdated) introduction to different concepts in Astronomy and Astrophysics, which should provide further background for the problems discussed at the class.
3. “Introduction to Cosmology”, by Barbara Ryden
This a modern and accessible introduction to cosmology, which provides further reading for cosmology problems throughout the course.

Grading/Evaluation Scheme

Grading is based on the solutions to the problems that students hand in at each session (50%), as well as their participation in the discussions and their performance in explaining their approaches during the class (50%). The solutions at each session is presented by one of the students who has volunteered the previous week.

Instructors:

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Course Webpage: <http://www.markcwyman.com/course/>