PGF5292: Physical Cosmology I

Course Information

The purpose of this course is to prepare you for *professional work* on Astrophysics and Cosmology, which may range from theoretical work to analysis of observed data, and the phenomenology connecting both. *Physical Cosmology I* will focus both on the foundations, as well as on more advanced topics and recent developments.

Instructor: Marcos Lima, `mlima@if.usp.br`
Website: `www.fma.if.usp.br/~mlima` + click on "Teaching"+ "Physical Cosmology I"
Meetings: Tuesdays and Fridays, 14:00 hrs, by zoom.
Office hours: Tuesday, right after class.

References:

- Main text: Dodelson, *Modern Cosmology*, 1st Edition.
- Other references:
  Weinberg, *Gravitation & Cosmology* and *Cosmology*,
  Peacock, *Cosmological Physics*,
  Kolb & Turner, *The Early Universe*,
  Peebles, *Principles of Physical Cosmology* and *Large-Scale Structure of the Universe*,
  Little & Lyth, *Cosmological Inflation and Large Scale Structure*,
  Mukhanov, *Physical Foundations of Cosmology*,
  Padmanabhan, *Structure Formation in the Universe*,
  Amendola & Tsujikawa, *Dark Energy: Theory and Observations*.
- Lecture Notes may also be provided throughout the course.
- All material used is in English, which you are supposed to master at this point.

Grades:
Your grade will be based on weekly Problem Sets (50%) and a Final Project (50%) on a topic of your choice. Some rules:

- The Problem Set must be returned to me directly on the *due date* at the end of class. No excuse will be accepted for returning homework late. Late homework will be accepted but will have 1.0 point discounted for each late day, up to a maximum of 3 days, after which the homework will not be accepted. If you return your solutions on the due date, but after class time, you must send it to me by e-mail (either a LaTeX generated pdf or a scanned pdf); failing to do so will count as one day late.
- We will not have make-up Problem Set ("substitutiva"). Instead, from all Problem Set grades, the *lowest grade* will be *disregarded* when computing your average grade. So in principle you may choose not to return one Problem Set, with no effect on your final grade.

- Some problems will require numerical calculations in a programming language of your choice. Please prepare yourself for that.
- Since the idea is to prepare you for professional work on Cosmology, if you write your Problem Set Solutions in English, you get an extra 0.5 point in each set.
- If you type your Problem Set in LaTeX (electronic format) you get an extra 0.5 point in each set.
- You may discuss the Problem Set with other people, but make sure you write your own numerical programs, and that you understand and write your own solution to each problem. Simply copying someone else's work will be regarded as very dishonest.

- The Final Project will consist of a Final Paper you must hand in on a specified date, along with a 30 minute Final Presentation you must give at the end of the semester.
- The Final Paper must be written in LaTeX. If you write the paper in English you may get up to 0.5 extra point (depending on your proficiency).
- Finally, if you speak in English on you Final Presentation you may get up to 0.5 extra point (depending on your proficiency).
- You may discuss your Final Project with other people that have similar topics, but again make sure you write yourself every word in your Final Paper, and prepare your own Final Presentation.
- In the Final Presentation, you will be evaluated for the content of your talk, and also for your ability to communicate and compress ideas properly in the appropriate time. You should practice your talk many times before the actual presentation, so that you become confident and fluent on the subject.

Final Project: See details and ideas for topics in separate sheet.

Course Schedule: See rough tentative schedule in separate sheet.

Recuperação: If necessary, we will schedule a make-up exam in June.