

Astrophysics

Week One Unit Information

PVB220 Cosmology: Semester 2, 2021

Overview

This unit of study explores the origin and evolution of the universe, from the Big Bang to the present. Topics presented include special and general relativity, the physics and geometry of space-time, inflationary cosmology, cosmic microwave background, dark energy and dark matter, supermassive black holes, gravitational waves, and the status of Australian cosmology surveys.

While this university-wide major has no formal prerequisites, students are assumed to have a basic knowledge of mathematical solutions of equations and the concept of functions. Students can get free help with maths skills through various workshops, group study and peer assistance.

Unit Coordinator

Dr Michael Cowley

Astrophysics Research & Teaching Associate

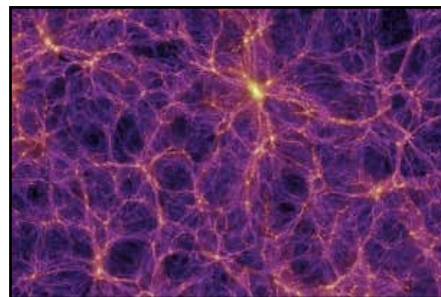
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Lectures

Lectures will be delivered on-campus every Monday, Weeks 1 – 12 in GP B121. An online discussion forum will also be available to allow students to discuss topics or ask questions. The lectures will cover the following topics (not necessarily in this order):

- Special and General Relativity
- The Big Bang
- Cosmic Microwave Background
- Formation and Evolution of Galaxies
- Active Galactic Nuclei and Supermassive Black Holes
- Gravitational Lensing
- Dark Matter, Dark Energy & Concordance Model
- Gravitational Waves
- Astronomical Data and Tools



Large Scale Structure (Source: Millennium Simulation Project)

Each week, homework problems (non-assessed) will be provided during the lecture as a mean to track your progress and prepare for the **Final Exam**.

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Workshops

Workshops will be held on-campus every Thursday, Weeks 1 – 12 in GP E410. While the lectures discuss the big concepts in cosmology for your **Final Exam**, the workshops dig deeper and equip you with the tools and knowledge required to complete your **Scientific Report** assessment item.

In addition to this, we will also use this time to work through the solutions to the homework problems provided in the lectures.

Assessment Items

This unit will be assessed through the following:

- **Scientific Report (50%)**
- **Final Exam (50%)**

The **Scientific Report** will require you to work in a team of two or three to find and analyse astrophysical data and write a paper in the form required for submission to a mock physics journal. This report is broken into three components to provide students with ongoing feedback throughout the semester:

1. Annotated Bibliography (10%) due Week 6 (Individual Assessment)
2. Literature Review (20%) due Week 9 (Individual Assessment)
3. Journal Article (20%) due Week 13 (Group Assessment)

More information on the **Scientific Report** will be provided in the first workshop, while more information on the **Final Exam** will be provided during the lectures.

Textbook

An Introduction to Modern Astrophysics 2nd ed, Carroll and Ostlie, Pearson, ISBN 0- 321-44284-9. (N.B. This is the same book used for PVB210). You can borrow one of two copies from the QUT Library. Otherwise, the library also offers an online eTextbook version for short-term loan.

Academic Integrity

QUT is committed to maintaining high academic standards to protect the value of its qualifications. To assist you in assuring the academic integrity of your assessment, you are encouraged to make use of the support materials and services available to help you consider and check your assessment items. Important information about the university's approach to academic integrity of assessment is on your unit Blackboard site. Plagiarism is considered to breach QUT's standards of academic integrity. A breach of academic integrity is regarded as Student Misconduct and can lead to the imposition of penalties, including exclusion.