

ASTRONOMY 155, The Big Bang Fall '20 (remote) – Syllabus

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Email Office Hours: Mon-Fri, 1-4 pm

Keep checking UVM Blackboard (Bb) for course updates.

Purpose: Modern cosmology concerns the origin and evolution of our universe, and the best theory today is the so-called Big Bang model. Recent evidence particularly supports the Inflationary version of the Big Bang. This course will familiarize you with the theories and questions in a mostly non-mathematical context. Topics briefly mentioned in Astr 005 will be first reviewed and then explored in far greater detail.

Remote Format: MS Teams lectures will become available through a Bb link at each scheduled class time and remain through the semester. Questions must be asked via email and will be answered promptly. More common questions will also be posted on Bb. More common answers will also be posted on Bb. Questions will also be posted weekly on the Bb Discussion Board, and you are invited to submit ungraded comments and answers.

Prerequisites: Astronomy 005; Math 10 (or permission)

Classes - Topics:

- 1- Intro, “centers” and log relations
- 3 - A brief review of pertinent topics from Astr 005
- 2 - Review of Relativity theory
- 1 - The Cosmological Principle and its implications
- 1 - The Friedmann equation and the Steady State and “Big Bang” solutions
- 1 - The Hubble Law, how it evolved and what it means
- 1 - Speaking in redshifts
- 1- Review of quantum theory
- 2 - The Horizon Problem & and the Flatness Problem
- 2- Dark energy and dark matter
- 1 - The Inflationary version of the Big Bang
- 1 - CMB anisotropy, WMAP and Planck
- 1 - The Hubble XDF and Frontier Fields projects
- 1- Bicep II, LIGO and gravity wave detections
- 1 - What is the “Lyman Alpha forest” and why do we care?
- 1 - The Anthropic Principle: “fine tuning” the parameters of our universe
- 1- Planck units
- 1 - The Multiverse
- 1- Holographic Universe and Branes
- 1 - James Webb Space Telescope and/or Lyman Alpha forest
- 1 - Exobiology and the Drake Equations

Recommended Text Material: UVM Blackboard and other Web pages

Grade Structure: 6 biweekly tests at 12% each, plus one longer cumulative final test at 28%. Tests will be multiple choice on Bb. Some answers may be explicit in the lectures, and others you will have to figure out. You can ask me for pointers, but otherwise work alone on them.