

PHYS 4247: Cosmology and Extragalactic Astrophysics

Fall 2017, Tuesday & Thursday 12:00pm-1:15pm, Howey S107

Instructor: Prof. David Ballantyne

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Class website: <http://ballantyne.gatech.edu/phys4247/index.html>

Required Textbook: *Introduction to Cosmology, 2nd Ed.*, by B. Ryden, Cambridge Univ. Press

Other Good Books: *An Introduction to Modern Cosmology, 2nd or 3rd Ed.*, by A. Liddle, Wiley
Extragalactic Astronomy and Cosmology: An Introduction, by P. Schneider, Springer
Galaxies in the Universe: An Introduction, 2nd Ed., by L.S. Sparke & J.S. Gallagher, III, Cambridge Univ. Press

Outline: *I. Cosmological Models*

- Cosmological Principle
- Newtonian Cosmology and Friedmann Equation
- Fluid and Acceleration Equations
- Relativistic Cosmology and Friedmann Equation
- Cosmological Constant
- Cosmological Parameters and Observational Tests

II. The Early Universe

- The Cosmic Microwave Background
- Big Bang Nucleosynthesis
- Inflation (what is it good for?)

III. Large Scale Structure

- Growth of Gravitational Instabilities (static Universe)
- Growth of Gravitational Instabilities (expanding Universe)
- The Power Spectrum and 2-point Correlation Function

IV. Properties of Galaxies

- Elliptical Galaxies
- Spiral Galaxies
- Scaling Relations
- Distance Determination
- Luminosity Function

Evaluation: 5 problems sets

(Due: Sept. 14, Sept. 28, Oct. 19, Nov. 2 & Nov. 28)

35%

Computational Project (Due: Dec. 5, 2017)	25%
2 Midterms (Oct. 3 & Nov. 7)	15%
Comprehensive Final Exam (Dec. 8, 2017; 11:30am-2:20pm)	25%

- Notes:**
1. Grading Scale: A=90-100; B=80-89; C=70-79; D=60-69; F \leq 59
 2. There will no curving of exam grades.
 3. Late assignments *not* accepted unless previous arrangements have been made.
 4. Students encouraged to work and discuss problems together, but written work *must* be your own.
 5. Lecture notes will be put on the course website, as will assignments and solutions.
 6. Read the Academic Honor Code:
<http://www.policylibrary.gatech.edu/student-affairs/academic-honor-code>
 7. Grades will be posted on T-square. Students should check the accuracy of all grades.
 8. Assignment due dates may be adjusted as needed.
 9. A one-page (front & back) 'cheat sheet' is allowed for both Midterms and the Final Exam.

Computational Project: Details will be announced in class in early October.

Expectations: At the conclusion of this course, students will be expected to quantitatively describe the current cosmological model, as well as qualitatively explain the evolution of the Universe through its various states from just after the Big Bang to the far future. Students will also be expected to understand and describe the observational and experimental evidence that has led to this model.