

PHYS 4247 Syllabus

Cosmology and Galaxies, Section A, 3 Credit Hours

Fall 2026

Instructor Information

Instructor: Prof. David R. Ballantyne (he/him/his)

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Office: College of Computing Rm. 119

Office Hours: TBA

General Course Information

Description

Modern cosmology of the universe, with the emphasis on the origin and evolution of galaxies and clusters of galaxies, inflation, the cosmic microwave background, dark matter and dark energy.

Course Learning Outcomes

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.

Required Course Materials

Introduction to Cosmology, 2nd Ed., by B. Ryden, Cambridge Univ. Press. Available at Georgia Tech Barnes and Noble Bookstore.

Other Good Books (all optional):

- 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

Grading Policy:

Grading Scale: A=90-100; B=80-89; C=70-79; D=60-69; F <= 59

- 5 problems sets 35%
- Computational Project 25%
- 2 Quizzes 15%
- Comprehensive Final Exam 25%

Description of Graded Components

- Details on the Computational Project will be announced in early October.
- Unless necessary, quiz and exam grades will not be scaled nor curved.
- Students encouraged to work and discuss problems together, but written work must be your own.
- All assignments, lectures notes and solutions will be posted on Canvas. However, regular class attendance is vital for success in the course.
- Grades will be posted on Canvas. Students should check the accuracy of all grades.
- Assignment due dates may be adjusted as needed.
- A one-page (front & back), handwritten 'cheat sheet' is allowed for both quizzes and the Final Exam.

Course Policies

Attendance and/or Participation

Each student should be aware of the regulations that are listed in the student handbook. The class attendance policy, which the Georgia Tech regulations say shall be at the discretion of the instructor, will be as follows: There will be no prescribed maximum number of unexcused absences for this class. You are expected to attend the class sessions unless you have a compelling reason not to do so. However, if it is apparent that lack of attendance at class may be impairing a student's performance in the course, the instructor may require that the student not miss more classes, under the penalty of failing the course. Please consult <http://catalog.gatech.edu/rules/4/> for details on what constitutes an excused absence and other aspects of the Georgia Tech Attendance Policy.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

AI Policy

AI tools such as ChatGPT are allowed for developing code/algorithms for the Computational Project. Code in the final project that originates from ChatGPT or similar AI tool must be identified as such in the comments when the Computational Project is turned in. All other uses of AI in this course are prohibited unless agreed upon by the course instructor.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Extensions, as well as the late turn in of assignments, will be considered if I receive a written request over email at least 1 day before the normal due date.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Statement of Intent for Inclusivity

As a member of the Georgia Tech community, I am committed to creating a learning environment in which all of my students feel safe and included. Because we are individuals with varying needs, I am reliant on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community. I have completed SafeSpace and QPR training.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

A list of resources for undergraduate students' academic success and information about advising can be found at [Success at Tech](#).

- Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A [comprehensive list](#) of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being ([student-resource-guide \(gatech.edu\)](#))

More resources on supporting student well-being on the syllabus and beyond are available through the [Learning Well Initiative](#).