

Astronomy 421

General Relativity and Cosmology
Spring 2024
University of Tennessee Knoxville

Instructor Information

Instructor: Dr. Sherwood Richers (a.k.a. Sherwood Lagergren)

Email: richers@utk.edu

Office: South College 106

Office Hours: TBD

Class Meeting Times

Lecture: Nielsen Physics Building 304, TR 12:55-2:10pm

Discord (TA and students only): TBD

Honor Code

You may not obtain an unfair advantage over other students and all proper credit must be given. If you have any questions about the policy, please ask me.

Copying: You may use reasonable external resources to better understand the material. However, as a matter of principle you should never see or hear solutions to any assigned problem, be it from another student, Course Hero, Chegg, etc. The only exceptions to this are class, office hours, and the optional student guide mentioned below.

Collaboration: Science is highly collaborative, and you are encouraged to collaborate verbally on homework. **You must cite** the people and resources you use for each question. For instance "I obtained this equation from wikipedia (with url)" or "Jane Doe helped me with this problem".

AI: You are required to submit all transcripts of AI (e.g., ChatGPT) used in this course. You may only use the free version of any AI to make the course equitable to all students.

Textbook

The textbook for the course is *A First Course in General Relativity* by Bernard Schutz.

There is also an optional accompanying guide that walks through some of the problems. *A Student's Manual for A First Course in General Relativity* by Robert Scott

You may also find the following references useful:

MIT Opencourseware: <https://ocw.mit.edu/courses/8-962-general-relativity-spring-2020>

Gravitation by Misner, Thorne, Wheeler - This is the canonical reference for relativity.

Spacetime and Geometry by Sean Carroll

Gravity by James Hartle

Gravitation and Cosmology by Steven Weinberg

General Relativity by Robert Wald

A Relativist's Toolkit: The Mathematics of Black-Hole Mechanics by Eric Poisson

Grading

Grades will be a weighted sum of grades in each of the following categories. The final letter grade will be assigned as follows, and grades within 1% of the boundary will be given a "+" or "-" (so a grade of 89.999% is a B+).

90-100%	A	Clear process, correct solution.
80-90%	B	Sound process, but small mistakes lead to incorrect solution.
70-80%	C	Some fundamental issues in the problem solving process, but also some demonstration of learned skills.
60-70%	D	Significantly flawed solution, but good effort toward trying to tackle the problem.
0-60%	F	No attempt or lack of significant content in solution.

Reading Questions (10%)

There will be online questions about the assigned reading due before the start of class each day. Collaboration is welcomed. Late submissions will not be accepted.

Homework (50%)

There will be homework due roughly weekly at the beginning of class on the assigned due date (one homework assignment per book chapter). Please bring paper copies stapled together. *Collaboration* is encouraged (you must still give credit to your collaborators for each problem), but *copying* is forbidden. See the honor code section for definitions. You can submit an assignment up to one week late for half credit.

Homework assignments will be graded largely on process, and the problems will be worked out in class the day the homework is due. You will be expected to submit solutions that clearly and legibly show your problem solving process, and not just a final answer.

For each problem, you must cite any people or resources (other than instructors) that helped you. Points will be taken off if this statement is missing.

Quizzes (30%)

In place of midterm exams, there will be a 15-minute quiz the day following the assignment due date (again, one for each chapter). Collaboration is not allowed, but you may bring a single 5"x7" index card (front and back). You will be allowed to resubmit the quiz one week after it is handed back, and your grade will be averaged between the two attempts. Your lowest quiz score will be dropped at the end of the semester.

Final Exam (10%)

The final exam will cover the entire course at the level of the reading questions, homework assignments, and quizzes. It is tentatively scheduled for 3:30-6:00pm on May 15, but check <https://registrar.utk.edu/calendar> for an updated schedule.

Logistics

- Students Disability Service: The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact Student Disability Services (SDS) at 865-974-6087 or sds@utk.edu.
- Sick policy: If you are sick or unwell, please let me know asap so we can make arrangements. If you have or were exposed to COVID-19, please follow the university guidelines at <https://studenthealth.utk.edu/covid-19>.
- Planned absences: If you know you will be absent from class (e.g. traveling to a conference) and will not be absent from class, let me know asap so we can arrange for you to submit assignments early.