

New Jersey Institute of Technology, Department of Physics,
Physics 421, Section 002 (CRN 14264), Spring 2017:

General Relativity

Mondays 8:30 am to 9:55 am, FMH 110

Wednesdays 1:00 pm to 2:55 pm, CKB 313

Office hours: Wednesdays and Thursdays, 10:00 am-11:00 am, and by appointment

Instructor: Dr. Andrés Jerez, Tiernan Hall 455

Phone: 973-596-3531, **email: jerez@njit.edu**

Textbook: James B. Hartle, **Gravity, an Introduction to Einstein's General Relativity**, Addison-Wesley, 2003, ISBN 978-0805386622

Announcements:

- **Moodle:** I will be posting course materials in Moodle. Go to <http://moodle.njit.edu>, log in with your UCID. Rutgers students check here: http://moodle.njit.edu/rutgers_students.php

Grading:

Your final grade in Physics 421 will be determined by your performance on the following:

- **Exam:** One exam will be given during the normal class period. The Schedule is:
 - Exam: **Wednesday, March 8**
- **Final Exam:** A comprehensive examination of the entire semester's work will be given at the end of the semester, during the exam period (5/5-5/11)
- **Homework:** Homework assignments will be posted, with their due date. You may work together in completing the homework. However, each student must turn in his/her own weekly assignment. You are responsible for knowing what is in your homework papers. Handing in a paper containing someone else's work is a violation of the honor code.
- **Attendance:** Attendance at the lectures is expected, and participation is part of the grade.

All these factors will be combined in the following proportion:

- 20% for the exam
- 20% for the final exam
- 50% for the total homework grade
- 10% for class participation

Your final grade will be determined using the following scale:

Total Score	Final Grade
85% and above	A
75% - 84%	B+
65% - 74%	B
55% - 64%	C
50% - 54%	D
49% and less	F

Academic Integrity:

NJIT policy is zero-tolerance for cheating of any kind and for student behavior that disrupts learning by others. Incidents will be immediately reported to the Dean of Students. The penalties for violations range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on a student's permanent record. Avoid situations where your own honorable behavior could be misinterpreted.

<http://www.njit.edu/academics/integrity.php>

You may work together in completing the homework. However, each student must turn in his/her own weekly assignment. You are responsible for knowing what is in your homework papers. Handing in a paper containing someone else's work is a violation of the honor code.

Courtesy:

Please, do not eat, drink, or create noise that interferes with the work of students or instructors. Cellular phones, wireless devices, and messaging devices of all kinds should be turned off during class meetings and exams.

Learning Outcomes:

- Basic knowledge and understanding of the theories of Special and General Relativity.
- Conceptual understanding of the links between Newtonian Mechanics and Relativity.
- Learn the connection of the Theory of Relativity to Experiment and Observation.
- Develop geometrical insight into the properties of Space-time and Relativity.
- Describe and perform relativistic calculations.
- Improve analytical problem solving skills

Syllabus:

- Week 1: Gravitational Physics, Geometry as Physics (Ch. 1,2)
- Week 2: Space, Time, and Gravity in Newtonian Physics (Ch. 3)
- Week 3: Principles of Special Relativity (Ch. 4)
- Week 4: Special Relativistic Mechanics (Ch. 5)
- Week 5: Gravity as Geometry (Ch. 6)
- Week 6: The Description of Curved Spacetime (Ch. 7)
- Week 7: Geodesics (Ch. 8)
- Week 8: The Geometry outside a Spherical Star (Ch. 9)
- Week 9: Gravitational Collapse and Black Holes (Ch. 12)
- Week 10: Gravitational Waves (Ch. 16)
- Week 11: Cosmological Models (Ch. 18)
- Week 12: Curvature and the Einstein Equation (Ch. 21)
- Week 13: The source of Curvature (Ch. 22)