Course Outline for AS.171.646 (General Relativity)

Instructor:	**Emanuele Berti**
Class Schedule:	Tue/Thu 9:00am-10:15am
Classroom:	Bloomberg 475
Office Hours:	By appointment
Instructor's Office:	Bloomberg 449
Teaching Assistant:	Mohit Srivastav (msrivas6 [at] jhu.edu)
Course Website:	`https://pages.jh.edu/~eberti2/teaching/`

Main textbooks:

(1) *Gravity: Newtonian, Post-Newtonian, Relativistic*, by Eric Poisson and Clifford M. Will

(2) *A Relativist's Toolkit*, by Eric Poisson

Suggested/complementary reading:

For complementary material on compact objects (black holes and neutron stars):

(1) *Black Holes, White Dwarfs and Neutron Stars*, by Stuart L. Shapiro and Saul A. Teukolsky

(2) Instructor's notes and Mathematica notebooks on *Black Hole Perturbation Theory*, https://www.icts.res.in/event/page/3071

More basic introductions to general relativity:

(1) *Spacetime and Geometry: An Introduction to General Relativity*, by Sean Carroll

(2) *A First Course in General Relativity (Second Edition)*, by Bernard Schutz

(3) *Gravity: An Introduction to Einstein's General Relativity*, by James B. Hartle

(4) *General Relativity and its Applications*, by Valeria Ferrari, Leonardo Gualtieri and Paolo Pani

We may occasionally refer to specific material from various books and technical articles, including:

(1) *Gravitation*, by Charles W. Misner, Kip S. Thorne and John Archibald Wheeler

(2) *Modern Classical Physics*, by Kip S. Thorne and Roger D. Blandford

(3) *General Relativity (Second Edition)*, by Norbert Straumann

(4) *Relativity in Modern Physics*, by Nathalie Deruelle and Jean-Philippe Uzan

(5) *Gravitational Waves: Volume 1: Theory and Experiments* by Michele Maggiore

(6) *Gravitational Waves: Volume 2: Astrophysics and Cosmology*, by Michele Maggiore

(7) *Gravitational-Wave Physics and Astronomy: An Introduction to Theory, Experiment and Data Analysis*, by Jolien D. E. Creighton and Warren G. Anderson

Course goals and learning outcome:

The goal of this course is to provide an introduction to general relativity and relativistic astrophysics. The course is addressed to students with a background in Newtonian gravity, classical mechanics, electromagnetism and modern physics.

Homework, in-class tests and final exam:

Homework assignments will be announced in class, and they must be turned in by the beginning of class on the due date. **Late homework will not be accepted.** In exceptional cases students may be excused from turning in an assignment. Homework must be easy to read: please write down clearly your name and the problem set number, do not use a red pen, and write consistently on either one side or both sides of the paper. You can submit you work as pdf files by email.

Attendance:

There is no strict attendance requirement, but you are strongly advised to attend class. Inform me in advance by email if you have a serious reason why you must miss a test or you cannot complete your homework on time.

Academic Integrity:

Violations of the University's policy of academic integrity will result in a failing grade and other disciplinary actions.

Note:

If a change in the syllabus becomes necessary during the semester, it will be discussed in class and then posted on the course website. The course website will also contain up-to-date information on the class schedule, homework assignments and complementary material.