

## COURSE OUTLINE FOR PHYS 750 (ADVANCED GRAVITATIONAL PHYSICS)

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INSTRUCTOR:	<b>Emanuele Berti</b>
CLASS SCHEDULE:	Tue/Thu 11:00am-12:15pm, Lewis Conference Room 228
OFFICE HOURS:	By appointment
COURSE WEBSITE:	<a href="http://www.phy.olemiss.edu/~berti/teaching/">http://www.phy.olemiss.edu/~berti/teaching/</a>
PHONE:	662-915-1941
COURSE CREDIT HOURS:	3

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### TEXTBOOK:

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

### FURTHER READING:

- (2) Instructor's notes and Mathematica notebooks on *Black Hole Perturbation Theory*, <https://www.icts.res.in/event/page/3071>
- (3) *Black Holes, White Dwarfs and Neutron Stars*, by Stuart L. Shapiro and Saul A. Teukolsky
- (4) *Gravitational Waves: Volume 1: Theory and Experiments*, by Michele Maggiore
- (5) *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:

This is an advanced course in gravitational physics, meant to be an introduction to current research. We will start from an advanced treatment of Newtonian gravity, and we will cover in depth the general relativistic two-body problem, black hole perturbation theory and gravitational-wave physics. The course is addressed to students with previous knowledge of general relativity and a strong mathematical background.

## EVALUATION:

GRADE TYPE: Letter Grade (A–F)

GRADE RANGES:

- A: 88% and up
- B: 75-87%
- C: 60-74%
- D: 40-59%
- F: less than 40%

GRADE PERCENTAGE: 50% Homework  
50% Final exam

## HOMEWORK, IN-CLASS TESTS AND FINAL EXAM:

This course will require long and complex calculations that cannot be covered in class. For this reason, instead of giving homework assignments I will require you to read specific parts of the Poisson-Will book and of my lecture notes **before** class. We will use our classroom time to discuss the most important conceptual issues and to go through some of the most complicated calculations. **I will ask you to turn in specific calculations to verify your understanding of the material. Because of the organization of this class it is essential that you turn in your work in time. Late homework will not be accepted.** Your work must be easy to read: please write down your name, write consistently on either one side or both sides of the paper, and staple the pages together. The final exam will consist of an **oral examination**.

## 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 an exam 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.