

## COURSE OUTLINE FOR PHYS 308 (MATHEMATICAL PHYSICS)

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INSTRUCTOR:	<b>Emanuele Berti</b>
OFFICE:	205 Lewis Hall
CLASS SCHEDULE:	Tue & Thu 11:00am-12:15pm, Lewis Room 109
OFFICE HOURS:	By appointment
EMAIL:	berti@phy.olemiss.edu
COURSE WEBSITE:	<a href="http://www.phy.olemiss.edu/~berti/phys308/">http://www.phy.olemiss.edu/~berti/phys308/</a>
PHONE:	662-915-1941

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PREREQUISITE:	PHYS 211, PHYS 212
CO-REQUISITE:	MATH 353
COURSE CREDIT HOURS:	3

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### TEXTBOOK:

- (1) *Mathematical Methods in the Physical Sciences*, Third Edition, by Mary L. Boas

### OTHER USEFUL BOOKS:

- (2) *Mathematics of Classical and Quantum Physics*, by Frederick W. Byron and Robert W. Fuller
- (3) *Advanced Mathematical Methods for Scientists and Engineers: Asymptotic Methods and Perturbation Theory*, by Carl M. Bender and Steven A. Orszag
- (4) *Numerical Recipes: The Art of Scientific Computing*, by William H. Press, Saul A. Teukolsky, William T. Vetterling and Brian P. Flannery
- (5) *Methods of Theoretical Physics*, by Philip McCord Morse and Herman Feshbach
- (6) *Geometrical Methods of Mathematical Physics*, by Bernard F. Schutz

The textbook for the course is *Mathematical Methods in the Physical Sciences*, by Mary L. Boas. I will refer to selected chapters from the other books for a more advanced treatment of certain topics.

### EVALUATION:

GRADE TYPE: Whole 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: 60% Homework  
10% Mid-term test  
30% Final exam

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

Homework assignments will be announced in class, and they must be turned in at 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 staple the pages together.

The final exam is open-book and will consist of problems to be worked out. Students will be allowed to use a calculator, and may be provided with an equation sheet by the instructor if necessary.

## COURSE GOALS AND LEARNING OUTCOME:

The course will cover some mathematical techniques commonly used in theoretical physics. This is not a course in pure mathematics, but rather on the application of mathematics to problems of interest in the physical sciences. Knowledge of physics at the level of PHYS 211-PHYS 212 is required.

## PRELIMINARY OUTLINE OF THE COURSE:

A preliminary list of topics to be covered in class (time permitting) includes:

- Infinite series, power series, and methods to improve the convergence of a series;
- The theory of analytic functions;
- Linear algebra, vectors and tensors in physics;
- Ordinary differential equations and methods for their solution;
- A brief introduction to “the art of scientific computing”.

This is a course in mathematical *physics*, so the emphasis will always be on physical applications.

## ATTENDANCE:

There is no strict attendance requirement. However I will not follow the textbook too closely and I will try to cover some more “advanced” material, so you are strongly advised to attend class. If you miss an exam or cannot turn in homework on time because of illness, I will require a doctor’s note. If you will be away for other reasons, please inform me prior to your absence and get a note if applicable.

## ACADEMIC INTEGRITY:

Violations of the University’s policy of academic integrity will result in a failing grade and other disciplinary actions. In particular, use of the Instructor’s Solution Manual is considered cheating. Students who use it will be subject to formal academic discipline charges.

## 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.