


Physics 310

Spring 2018

Mathematical Methods in Physics

Instructor:

Dr. Rebecca Grouchy



Web page:

Moodle

Class Time:

TTh 10:50am-12:05pm

Class Location:

SCI 122

Text:

Required: **Mathematical Methods in the Physical Sciences**, Mary Boas
The chapters to be studied, in order, are: 5, 6, 11, 2, 7, 12, 13.
Required: Wolfram *Mathematica* software

Description:

PHYS 310 presents some of the most important mathematical concepts vital to the study of physics at an intermediate level. This course is expected to serve as a bridge between the introductory courses and the upper-level courses. Successful completion of PHYS 212 or 213 along with MATH 161 are required.

Goals:

This course should introduce students to the analysis of physical systems at an intermediate level. A successful student should be able to analyze a wide variety of theoretical constructs and real-world situations. A successful student should also be familiar with the computational software *Mathematica*, one of many analytical tools used in professional physics research.

Topics covered include multiple integrals and vector analysis, complex numbers, Fourier series and transforms, special functions, series solutions, and partial differential equations.

Structure:

Lecture – The traditional lecture portion of the course is where course material is to be reinforced, not introduced. As such, **you are expected to have read the assigned portion before arriving to class**. The class, being a small one, is expected to be informal to some degree, so class participation is highly encouraged.

Problem Sets – Homework is an important component of evaluation in this class. Paper portions of assignments will usually be due by noon on Fridays, and electronic portions of assignments will usually be due by midnight on Saturdays; see schedule below. There will be 12 problem sets; all will require the use of *Mathematica*. **Collaboration is encouraged, but work submitted must be completely original.**

Exams:

There will be three exams: two midterms and a comprehensive final exam. Students who have an 80% at the end of the semester then you will be exempted from the final exam.

Attendance:

Class attendance is vital to your understanding of the subject. If you miss six classes (excused or unexcused), your final grade may be dropped by a letter grade. If you miss eight or more, you may automatically receive a failing grade for the course.

Office Hours:	Dedicated office hours for this class will be decided after the first class meeting. I am also quite willing to meet with students at other times. Please get in touch with me and make an appointment; my schedule is posted on my office door.	
Et cetera	<p>One of the themes of this class is personal responsibility. Your grade in this class will depend on the effort you put into it. If you are having difficulties, come talk to me! I will help you in any way that I can.</p> <p>If there are special circumstances that I should be aware of, such as a learning disability or a planned unavoidable absence, it is your responsibility to bring this to my attention within the first week of the course. I will, of course, make any reasonable accommodations that you may need because of it.</p>	
Academic Honesty:	<p>The university's statement of community standards is: "Coastal Carolina University is an academic community that expects the highest standards of honesty, integrity and personal responsibility. Members of this community are accountable for their actions and are committed to creating an atmosphere of mutual respect and trust." http://www.coastal.edu/conduct/documents/codeofconduct.pdf In this class, a student's signature on every assignment is a confirmation of the student honor pledge and will be treated as such. Some assignments are meant to be collaborative (in-class activities), some are meant to be largely your own effort with limited outside help allowed (homework assignments), and some are meant to be completely your own effort (exams). For this course, a first cheating or plagiarism violation will result in a 'zero' grade for that assignment. A second will result in an automatic failing grade for the course. All violations will be reported according to the university's code of conduct.</p>	
Grading:	Homework	50%
	Midterm Exams	30%
	Final Exam	20%
Important Dates:	February 21	Midterm I (5, 6, 11)
	April 13	Midterm II (2, 7, 12)
	May 4 (11:00am)	Final Exam (cumulative; above plus 13)
Revisions:	This syllabus describes the course as best it can. The instructor reserves the right to make changes in its content. If changes must be made to it during the semester, students will be immediately notified.	

Student Learning Outcomes for PHYS 310

After successfully completing PHYS 310, a student should be able to...

- articulate knowledge of the most important ideas and methods in physics;
- solve problems with expert-level techniques;
- perform mathematical exercises;
- explain results of mathematical problems in a physics context;
- identify relevant mathematical evidence (theorems, equations, etc.) necessary to support methodology of solving problems;
- interpret solutions to draw reasonable mathematical conclusions;
- appraise the work of others in a constructive manner; and
- implement the mathematical software *Mathematica* as an aide to learning.

Course Schedule

January	9	Syllabus and Intro to Mathematica
	11	5.1 – 5.3
	16	5.4 – 5.5
	18	5.6
	19	HW 5A due
	23	6.1 – 6.5
	25	6.6 – 6.7
	26	HW 5B/6A due
	30	6.8
	1	6.9 – 6.10
February	2	HW 6B due
	6	6.11 – 6.12
	8	11.1 – 11.10
	9	HW 6C due
	13	11.11 – 11.13
	15	Review
	16	HW 11 due
	20	Exam I
	23	2.1 – 2.5
	27	2.8 – 2.10
March	1	2.11 – 2.14
	2	HW 2A due
	6	no class (Spring Break)
	8	no class (Spring Break)
	13	2.15 – 2.17
	15	7.1 – 7.5
	16	HW 2B due
	20	7.6 – 7.9
	22	7.10 – 7.13
	23	HW 7A due
	27	12.1 – 12.4
	29	12.5 – 12.8
	30	HW 7B12A due
April	3	12.9 – 12.10, 12.12 – 12.18, 12.20
	5	12.21 – 12.23
	10	Review
	11	HW 12B due
	12	Exam II
	17	13.1 – 13.3
	19	13.4 – 13.7
	20	HW 13A due
	24	13.8 – 13.10
	26	no class (study day)
	27	HW 13B due
May	3	FINAL EXAM (11:00am)