Physics 104A, Methods of Mathematical Physics
Fall 2009

Instructor Rena Zieve
Office: 243 Physics/Geology
Lab: 230/232 Physics/Geology
Office hours: 10:30-11:30 Monday, 12:30-1:30 Tuesday
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Course web page: http://london.ucdavis.edu/phys104/phys104.html
Cell phone: (530) 219-8155; don't call 10PM-7AM
I will be in my office or lab during my scheduled office hours each week.
You are welcome to find me for brief questions at other times. E-mail is by
far the best way to get in touch with me.

Teaching   Amandeep Kaur
Assistant   Office hours: 3-4 Monday, 10:30-11:30 Wednesday, 3-4 Thursday, in Roessler
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Textbook   Boas, Mathematical Methods in the Physical Sciences, edition 2 or 3
Other reference texts:
        Arfken and Weber, Mathematical Methods for Physicists
        Bradbury, Mathematical Methods

Prerequisites Math 21ABCD, 22AB; Physics 9ABCD. If you haven't taken all these
courses, talk to me. Many of them will be helpful but aren't strictly nec-
essary, so you may be able to take Physics 104 without having completed
them all.

Grading   **Homework 20%**
Problem sets will be due roughly once a week. If they are due on a day class
doesn't meet (to avoid conflicts with other physics courses), they should be
turned in to my mailbox on the second floor of Physics/Geology by the time
specified. Otherwise they are due at the beginning of class. Late problem
sets will usually be accepted for half credit up to a specified deadline about
two days after the intended due date. Others receive no credit. The lowest
problem set grade will be dropped.

Midterm 30%
There will be one midterm, probably on November 5, 2009.

Final Exam 50%
The final will be on Tuesday December 8, 2009 at 1 PM. Approximately
three-quarters of the final will test material covered after the midterm.

Course Outline

Topic	Boas chapters (3rd edition)	Boas chapters (2nd edition)	Estimated dates
Complex numbers	2	2	9/24
Dirac delta function	8.11	15.7	9/29
Sequences and series	1.1-1.9	1.1-1.9	10/1
Power series, Taylor expansion	1.10-1.15	1.10-1.15, 4.2	10/6
Vector spaces	3.1-3.5, 3.14, 12.6	3.1-3.5, 12.6	10/8, 10/13
Linear transformations	3.6-3.12	3.6-3.9, 10.1-10.5	10/15, 10/20
Fourier series	7.1-7.11	7	10/22, 10/27, 10/29
Legendre series	12.1-12.10	12.1-12.10	11/3, 11/10
Partial differential equations			11/12
Separation of variables in PDEs	13.2	13.2	11/17
Series solutions of PDEs	13.3-13.8	13.3-13.8	11/19, 11/24
Fourier transforms	7.12, 13.9	15.4-15.5, 15.9	12/1, 12/3

104C

A second quarter of math methods, Physics 104C, is taught in the spring in alternate years and will next be offered in 2010. Physics 104C continues with PDEs and continuous Fourier transforms, and also covers discrete Fourier transforms, complex analysis, probability, and one or two other topics depending on students' preferences. Possibilities include tensors, group theory, and calculus in curvilinear coordinates.

Problem Sets

My problem set questions and test questions for this class often have different styles. Sometimes a moderate or long calculation helps illuminate or reinforce a topic, so the problem sets do involve computation. On the other hand, on tests I want to probe your understanding of the concepts I've presented, rather than your ability to do algebra, so long calculations are rare. To help you prepare for the tests, I will list the main topics covered at the beginning of each problem set. In many cases I will also include extra test-style problems (labeled with a 'T') at the end, and state how much time I would allot for them. These 'T' problems need not be handed in. I strongly advise looking at them only after completing the rest of the problem set, and giving yourself only the suggested time. When you really understand a topic well, the 'T' problems usually seem easier than the rest of the problem set.

Students in the course have widely varying backgrounds in mathematics. I hope to give everyone a chance to learn and be challenged, so there is also a wide range of difficulty in the problem set questions. Don't be too discouraged if you can't answer quite all of them; if you can do the 'T' problems, you'll do fine in the class.