

Physics 129a  
Fall 2007  
Course Notes

**Notes about course:**

- Physics 129a is devoted to what may loosely be called “analysis”. Physics 129b is devoted to “group theory” as used in physical applications. Finally, Ph 129c is devoted to probability and statistics.
- The book by Mathews and Walker is the text for Ph 129a. It has the merit that it gives a fairly complete overview without being verbose. It contains a lot of “tricks of the trade”. Some people would prefer to use a book such as Arfken, and you may find it handy as a reference that goes into more detail on some subjects. However, Mathews and Walker covers more ground, and is still the best “all-around” math methods book in my opinion. I will also provide course notes on some of the topics we will cover. These will be available on the web page for the course.

You may also wish to refer to any of a large number of other books on mathematical methods in physics. I mention Arfken above, but there are many others. I’ll mention some other resources as we go along.

- Grades will be entirely on homework, that is, there will be homework sets as usual instead of a midterm or final.
- Homework will be handed out Wednesday, due the following Wednesday.
- Collaboration policy: OK to work together in small groups, and to help with each other’s understanding. Best to first give problems a good try by yourself. Don’t just copy someone else’s work – whatever you turn in should be what you think you understand.
- There is a web page for this course, which should be referred to for the most up-to-date information. The URL:  
<http://www.hep.caltech.edu/~fcp/ph129/>
- TA:
  - Jeffrey Atwell
  - [atwell@caltech.edu](mailto:atwell@caltech.edu)

- I may have solutions to some of the problems somewhere on my web site. Do not look at these until after you have turned in the problem set!

Here is a brief outline of the topics I plan to cover in Ph 129a:

1. Integral equations and transforms
2. Linear spaces, operators
3. Sturm-Liouville theory
4. Special functions
5. Green functions
6. Introduction to distribution theory
7. Calculus of Variations
8. (Optional) Measure theory, Lebesgue integral

The optional item depends on time and class interest.