

**Physics 026                      First Paper Assignment                      Fall 2007**  
**Due last day before fall break: Friday Oct. 12, 2007**  
**Absolute deadline - No extensions**

You can hand in your paper in whatever form you find convenient:

1. Printed on paper (safest form)
- or 2. Electronic format (via email)  
    PDF file (preferred) or Word document  
    Email it to yourself first to make sure that it  
    transfers without corruption. I will print your document  
    out as soon as I receive it to make sure all is OK.

You now know the fundamental principles behind chaos and fractal theory. There is, however, much more to learn. This writing assignment gives you a chance to use what you have learned and add to your learning with new sources of information. Choose one of the topics below that strikes you as interesting.

**Possible Paper Topics**

1. Discuss the relation of fractals and chaos to reductionist thought.
2. Discuss the implications of fractals and chaos on predictability.
3. Discuss the implications of fractals and chaos on the distinction between determinism and randomness.
4. Chaos: Simple systems can do surprising things. Explain and illustrate.
5. Discuss the statement: "The whole is really greater than the sum of its parts"
6. Pick a topic from Stewart that we did not cover (Chaps 14-16). Write a paper on that topic, being sure to relate the topic to what we discussed in seminar.
7. Strange attractor, self-similarity, sensitive dependence on initial conditions, and fractal dimension are important ideas in the theory of chaos. Describe how you would explain these concepts to your roommate, assuming he or she has never heard of them.
8. Normally, the words order and chaos refer to two different situations with little connection between them. Yet many of our discussions and readings have included statements like, "chaos out of order" or "order out of chaos". Discuss the meaning of both of these words in some detail and how the two concepts are related.

## **Rules for Writing Assignments**

1. You must completely on your own. This serves two purposes. First, it will demonstrate both how well you have been learning the material up to now and how well you can learn something new. This is a good check on whether or not you have been relying too much on other people. Second, it will help you build up skills when working alone, something you will do regularly throughout your life. So, in writing your paper, you can consult non-human resources as much as you like (other books, the internet, etc), but do not discuss anything about the assignment with anyone else(except the professor).

**The assignment is to write a paper 10-15 pages in length (double-spaced) on one the above topics.**

Scientific writing often requires that equations, variables, numbers, and figures be included in the text. This can be done while adhering to the rules of grammar and while maintaining an effective writing style. Diagrams and simple figures usually allow you to give better explanations.

The college has very strict rules on plagiarism. You should take a look at them in the Student handbook. You need to cite sources for anything you did not think up entirely on your own. Be sure not to paraphrase or use actual phrases from references. It is best if you study the material fully, put all references aside, and write a first draft of your paper without consulting references. If you use an example or analogy from a reference, you must cite it, even if you change it slightly. Include a bibliography - any legitimate format for references and the bibliography is fine.