# SYLLABUS

# PHZ 3151, Computer Methods in Physics Spring 2009 Prof. Patrick Schelling

Lecture: BA 212, Mon. Wed. Fri. 1:30-2:20pm Office: MAP 305E Phone: 407-823-1884 Email: <u>pschell@mail.ucf.edu</u> Office hours: Mon, Wed 2:30-3:20pm, Thursday 2:00-3:15pm Midterms: Friday Feb. 13, Friday March 27 Final Exam: Monday May 4, 1:00-3:50pm, BA 212 Holidays: MLK Day, Monday Jan. 19, Spring Break, March 9-14.

### **Required Book:**

Nicholas J Giordano and H. Nakanishi, "Computational Physics," 2<sup>nd</sup> Edition, Pearson-Prentice Hall ISBN 0-13-146990-8

#### **Suggested Books:**

Press et al., "Numerical Recipes in Fortran 77: The Art of Scientific Computing", Volume 1, 2<sup>nd</sup> Edition, Cambridge University Press, ISBN: 052143064X

Press et al., "Numerical Recipes in Fortran Example Book: The Art of Scientific Computing", Cambridge University Press, ISBN: 0521437210

Arfken and Weber, "Mathematical Methods for Physicists", 6<sup>th</sup> Edition, Academic Press, ISBN: 0120598760

Jeffrey and Zwillinger (eds.), "Gradshteyn and Ryzhik's Table of Integrals, Series, and Products", 6<sup>th</sup> Edition, Academic Press, ISBN: 0122947576

Numerical Recipes in Fortran 77 is available online at: <u>http://www.nrbook.com/a/bookfpdf.php</u>

#### Grading:

Computer Projects:15%Midterm Exams:30%Written Homework:15%Final Exam:30%L will use ±/grades. The following grading scale will be use

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A 86-100A- 81-85B+ 78-80B 74-77B- 71-74C+ 68-70C 64-67C- 61-63D 51-60F < 51

This course is both an introduction to computational and numerical tools needed for physics, but also an opportunity to sharpen analytical skills. The class will be relatively evenly divided between numerical and analytical methods. In addition to written homework, computer projects will form a major portion of the course.

The numerical methods will be done using codes written in Fortran. In particular, we will develop the skills necessary to program in Fortran77. This is a somewhat outdated version of Fortran, yet it is a subset of more modern and widely used Fortran90. We will plan to learn some Fortran90 towards the end of the semester. We will try to use personal computers and laptops as often as possible. Please let me know if you need this assistance.

#### Planned Topics:

Introduction to Fortran programming; Ordinary Differential Equations (ODE); Partial Differential Equations (PDE); Fourier series; Non-linear equations; Linear algebra; Monte Carlo methods; Modeling of data

#### Missed Work, Makeup policy:

It is Physics Department policy that making up missed work will only be permitted for University-sanctioned activities and bona fide medical or family reasons. Authentic justifying documentation must be provided in every case (in advance for Universitysanctioned activities). At the discretion of the instructor, the make-up may take any reasonable and appropriate form including, but not limited to the following: a replacement exam, replacing the missed work with the same score as a later exam, allowing a 'dropped' exam, replacing the missed work with the homework or quiz average.

## UCF Golden Rule:

Your work should be your own, although working with your classmates is encouraged. Compute projects are group projects, but you are expected and required to participate and understand the work of your group.

Academic cheating and dishonesty will not be tolerated. As graduate students in science, the highest standards of honesty are essential. If cheating or dishonesty occurs, it will be handled according to the UCF Golden Rule. Please familiarize yourself with these rules. Cheating may result in failure or even expulsion.

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