SYLLABUS

PHY 5700 – Fall 2011

Instructor: Prof. Peter M. Hoffmann
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Tel. (313) 577 4573

Office hours/help sessions: W 3 pm, or by appointment

Class times and locations:

Unless otherwise noted, we will meet
M 11:45 am – 1:10 pm, Room 245
W 11:45 am – 1:10 pm, Computer Lab, Room 377

Class Website: Blackboard

Required Books & Texts:

1) Paul D. DeVries & Javier E. Hasbun, "A First Course in Computational Physics", 2nd edition, Jones and Bartlett (2011).
2) Rudra Pratap: "Getting Started with MATLAB", Oxford University Press (2010).
3) Additional handouts will be provided through Blackboard

Instructional Videos:

I will provide videos showing how to do things in MATLAB through Blackboard/ YouTube

Course Content:

This course will cover mathematical and computer applications to physics, biology and other related sciences. As part of the class, students will learn how to program in MATLAB.

Course Philosophy: This course will combine lectures, in-class exercises and projects to provide a hands-on learning environment. The course will be quite challenging and will require students to spend a significant time working on projects. I will be available to help with projects during the held session, W 3-4 pm.

Grading:

Homework: 5% - short exercise homework will be given occasionally
Attendance: 5% - loss of 1% for every missed class
Quizzes: 30% - quizzes will be weekly short quizzes on topics covered in class, reading materials or projects
Projects: 30% - short projects, will be done in groups of 2 students. Grade based on completion and the ability to explain project details.
Final project: 30% - Final projects done in groups of 4 students, grade based on project completion, final presentation, and ability to answer detailed questions about project.

Cutoffs for grades:

"Excellent"		"Good"		"Fair"		"Poor"		"Fail"	
A	95	B+	87	C+	77	D+	67	F	<60
A-	90	B	84	C	74	D	64		
		B-	80	C-	70	D-	60		

THE RULES

Please review these rules carefully.

1. **Make-up quizzes etc**: There will be no make-up quizzes for any reason. We will drop the lowest quiz grade from the grade calculations
2. **Incompletes:** As a rule I will not hand out any incomplete grades. Make sure to complete all necessary work during the semester, or, if that is not possible, drop the class.
3. **Grades:** Grades will be determined as detailed in this syllabus on a numerical basis only. I will not accept any special pleading at the end of the semester. You know what grade you need, so work for it!
4. **Bonus**: There will be no extra bonus beyond what is published in this syllabus.
5. **Mathematics**: This course expects that you are proficient in mathematics to the level of PHY 3700 and Calculus II.
6. **Cheating**: Any actual or attempted cheating will result in a Fail grade (F) either for a project. quiz or homework, or, depending on severity and for repeat offenses for the entire course. In the latter case a report to the university will be filed for further disciplinary action. Cheating includes copying from class mates or from the internet.

Tentative Course Outline:

DATES	TOPICS	READING
08/31	Course overview, Syllabus, Introduction to programming and MATLAB,Basics of Programming, Importance of Syntax, Good programming practices, Exercises – Room 245	Pratap, p. 1-38; deVries, p. 1-15
09/07	Introduction cont., Basics: Arrays, Matrices, Functions, Data importing and exporting, Exercises	Pratap, p. 38-62
09/12-09/14	Matrix and vector operations, strings, functions, plotting simple graphs	Pratap, p.63-98; DeVries, p. 15-20
09/19-09/21	Programming, Scripts, Functions, Complex numbers, PROJECT 1: Monster curves	Pratap, p. 99-134; deVries, p. 20-29
09/26-09/29	Advanced Graphing; PROJECT 2: Chaos in population dynamics	Pratap, p. 175-228; deVries, p. 29-37
10/03-10/05	Roots of functions, PROJECT 3: 1D Quantum mechanics, chemical bonds, energy bands	deVries, p. 70-88 + other parts of deVries Chapter 2

10/10-10/12	Interpolation, Approximations and Derivatives; PROJECT 4: TBA	Pratap, p. 135-149; deVries, some of Chapter 3
10/17-10/19	Curve fitting; PROJECT 5: Fitting models to data, Kepler's laws, Protein kinetics	See above
10/24 -10/26	Numerical Integration, PROJECT 6: Multidimensional integrals	deVries, Chapter 4, pp. 151-171, 185-190,; Pratap 152-156
10/31-11/02	Monte Carlo methods, PROJECT 7: Random walks and Diffusion in 2D, 3D; Bacterial motion	DeVries, pp. 192-206
11/07-11/09	Differential Equations I, PROJECT 8: Simulating motion and energy conservation	DeVries, Chapter 5, pp. 205-218, 227-238; Pratap 157-168
11/14-11/16	Differential Equations II, PROJECT 9: Nonlinear systems, phase space, Nerve cells and hearts	DeVries, pp. 238-258
11/21-11/23	Fourier analysis, PROJECT 10: Spectra of non-linear oscillators	DeVries, Chapter 6, 291-312, 331-347
11/28-11/30	FINAL PROJECTS*	
12/05-12/07	FINAL PROJECTS*	
12/12	Presentations	

*During the two weeks that students work on final projects, I will be available in the computer room during all regular class times and during the help session.