SYLLABUS

PHY 5700 – Fall 2012

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

Office hours/help sessions: TBD

Class times and locations:

Unless otherwise noted, we will meet
M 11:45 am – 1:10 pm, Room 245 or Computer Lab, Room 377
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 help 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 3-4 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	90	B+	82	C+	70	D+	58	F	<50
A-	86	B	78	C	66	D	54		
		B-	74	C-	62	D-	50		

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 classmates or from the internet.

Tentative Course Outline:

DATES	TOPICS	READING
08/29	Course overview, Syllabus, Introduction to programming and MATLAB, Importance of Syntax, Basics: Arrays, Matrices, Scripts, Functions, Exercises	Pratap, p. 1-42;
09/5	Introduction cont., Basics of Programming, Good programming practices; Data importing and exporting, Exercises	Pratap, p. 43-62 deVries, p. 1-15
09/10-09/12	Matrix and vector operations, strings, functions, plotting simple graphs	Pratap, p.63-98; DeVries, p. 15-20
09/17-09/19	Programming, Scripts, Functions, Complex numbers, PROJECT 1: Monster curves	Pratap, p. 99-134; deVries, p. 20-29
09/24-09/26	Advanced Graphing; Exercises	Pratap, p. 175-228; deVries, p. 29-37
10/01-10/03	Roots of functions, PROJECT 2: 1D Quantum mechanics, chemical bonds, energy bands	deVries, p. 70-88 + other parts of

		deVries Chapter 2
10/08-10/10	Interpolation, Approximations and Derivatives;	Pratap, p. 135-149; deVries, some of Chapter 3
10/15-10/17	Curve fitting; PROJECT 3: Fitting models to data, Solving linear equations, Kepler's laws, Protein kinetics	See above
10/22 -10/24	Numerical Integration, PROJECT 4: Numerical Integration; Multidimensional integrals	deVries, Chapter 4, pp. 151-171, 185-190,; Pratap 152-156
10/29-10/31	Monte Carlo methods, PROJECT 5: Monte Carlo Integration, Monte Carlo simulation, Random walks	DeVries, pp. 192-206
11/05-11/07	Differential Equations I, PROJECT 6: Simulating motion and energy conservation	DeVries, Chapter 5, pp. 205-218, 227-238; Pratap 157-168
11/12-11/14	Differential Equations II, PROJECT 7: Nonlinear systems, phase space, Nerve cells and hearts	DeVries, pp. 238-258
11/19-11/21	Fourier analysis, PROJECT 8: Spectra of non-linear oscillators	DeVries, Chapter 6, 291-312, 331-347
11/26-11/28	FINAL PROJECTS*	
12/03-12/05	FINAL PROJECTS*	
12/10	Presentations	

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