Physics 230 Class Schedule – Fall 2012

	Monday	Tuesday	Wednesday	Thursday	Friday
September	27 S1: Lab 1 Introduction	28 S2: Lab 1 Introduction	29	30	31 S3: Lab 1 Introduction
	3 **Labor Day Holiday**	4 S2: Lab 2 Functions & Lists	5	6	7 S3: Lab 2 Functions & Lists
	10 S1: Lab 2 Functions & Lists	11 S2: Lab 3 Plotting	12	13	14 S3: Lab 3 Plotting
	17 S1: Lab 3 Plotting	18 S2: Lab 4 Linear Algebra	19	20	21 S3: Lab 4 Linear Algebra
	24 S1: Lab 4 Linear Algebra	25 S2: Lab 5 Differentiation	26	27	28 S3: Lab 5 Differentiation
October	1 S1: Lab 5 Differentiation	2 S2: Lab 6 Integration **S2: Begin exam 1**	3	4 **S2: Exam 1 due at midnight**	5 S3: Lab 6 Integration **S3: Begin exam 1**
	8 S1: Lab 6 Integration **S1: Begin exam 1** **S3: Exam 1 due at midnight**	9 S2: Lab 7 Programming 1	10 **S1: Exam 1 due at midnight**	11	12 S3: Lab 7 Programming 2
	15 S1: Lab 7 Programming 1	16 S2: Lab 8 Programming 2	17	18	19 S3: Lab 8 Programming 2
	22 S1: Lab 8 Programming 2	23 S2: Lab 9 Data Processing	24	25	26 S3: Lab 9 Data Processing
	29 S1: Lab 9 Data Processing	30 S2: Lab 10 Optimization	31	1	2 S3: Lab 10 Optimization
November	5 S1: Lab 10 Optimization	6 S2: Lab 11 Complex Analysis **S2: Begin exam 2; Term project proposal due at midnight**	7	8 **S2: Exam 2 due at midnight**	9 S3: Lab 11 Complex Analysis **S3: Begin exam 2; Term project proposal due at midnight**
	12 S1: Lab 11 Complex Analysis **S1: Begin exam 2; Term project proposal due at midnight** **S3: Exam 2 due at midnight**	13 S2: Lab 12 Project 1	14 **S1: Exam 2 due at midnight**	15	16 S3: Lab 12 Project 1
	19 S1: Lab 12 Project 1	20 **Friday's Section!!** S3: Lab 13 Project 2	21 **No classes**	22 **Thanksgiving Holiday**	23 **Thanksgiving, cont.**
	26 S1: Lab 13 Project 2	27 S2: Lab 13 Project 2	28	29	30 S3: Lab 14 **Project Show & Tell/** Sample final exam **S3: Term project final report due at midnight**
December	3 S1: Lab 14 **Project Show & Tell/** Sample final exam **S1: Term project final report due at midnight**	4 S2: Lab 14 **Project Show & Tell/** Sample final exam **S2: Term project final report due at midnight**	5	6	7 **Reading Day**
	10	11	12	13 **S3 Final Exam 7-10 am**	14 **S1 Final Exam 11-2** **S2 Final Exam 2:30-5:30**

Physics 230 – Fall 2012
Dr. John S. Colton

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    You can navigate there via www.physics.byu.edu → Courses → Class Web Pages → Physics 230 (Colton).

Class Schedule, alternate view:

Lab	Section 1 Monday 12-3 pm	Section 2 Tuesday 8-11 am	Section 3 Friday 9 am-12 pm	Topics
1	Aug 27	Aug 28	Aug 31	**Introduction** (notebook basics, menus, documentation, syntax, applications and simple examples)
2	Sep 10	Sep 4	Sep 7	**Functions and Lists** (functions, arguments, list generation and processing, random numbers, statistics)
3	Sep 17	Sep 11	Sep 14	**Plotting** (plotting functions and lists)
4	Sep 24	Sep 18	Sep 21	**Linear Algebra** (vector and matrix operations, linear systems of equations, eigenvectors and eigenvalues)
5	Oct 1	Sep 25	Sep 28	**Differentiation** (limits, extrema, partial and higher-order derivatives, implicit differentiation, series expansions)
6	Oct 8	Oct 2	Oct 5	**Integration** (definite and indefinite integrals, multiple integrals, regional integrals, algorithms and options for numerical integration). Take home exam 1 due at midnight on **Oct 10**, **Oct 4**, and **Oct 8**, respectively.
7	Oct 15	Oct 9	Oct 12	**Programming I** (logic, conditional statements, piecewise functions, procedural vs functional programs, loop structures, recursive structures)
8	Oct 22	Oct 16	Oct 19	**Programming II** (scoping constructs, iterative equation solving, procedural flow control, debugging)
9	Oct 29	Oct 23	Oct 26	**Data Processing** (data import/export, text parsing and formatting, multimedia, integrated data sources)
10	Nov 5	Oct 30	Nov 2	**Optimization** (1D curve fitting, data variables vs parameters, cost functions, algorithms, uncertainties).
11	Nov 12	Nov 6	Nov 9	**Complex Analysis** (operations, unit circle, functions, calculus) Term project proposals due at midnight on **Nov 12**, **Nov 6**, and **Nov 9**, respectively. Take home exam 2 due at midnight on **Nov 14**, **Nov 8**, and **Nov 12**, respectively.
12	Nov 19	Nov 13	Nov 16	**Project 1**
13	Nov 26	Nov 27	Nov 20 (Tues)	**Project 2**
14	Dec 3	Dec 4	Nov 30	**Project Show & Tell/Sample final exam problems.** Term project final reports due at midnight on **Dec 3**, **Dec 4**, and **Nov 30**, respectively.
	Fri 12/14 11 am - 2 pm	Fri 12/14 2:30 - 5:30 pm	Thurs 12/13 7 - 10 am	**Final Exam**

Prerequisites: Everyone should have had Physics 121, 123, differential calculus, and be at least concurrently enrolled in Physics 220 & integral calculus.

Textbook: The course materials will consist entirely of laboratory exercises (available on the course website) and online software documentation. There are no textbooks or course packets to purchase.

Learning Outcomes: The objective of this one credit-hour class is that you develop fluency in formulating and solving physics problems using a symbolic-mathematics language like Mathematica. Mathematica is a powerful analytical tool that can be applied to a wide variety of problems in both academic and industrial settings. You will find it useful in most of your upper-division physics and astronomy courses and in a number of our research groups on campus. Many of our students say that Physics 230 was one of their favorite classes at BYU. Specifically, after completing this course you should be able to:

- Demonstrate the ability to apply calculus, linear algebra, and complex analysis to solve undergraduate-level physics problems.
- Demonstrate the ability to use programming constructs such as looping, conditional execution, and iteration to solve physics problems.
- Solve equations, including systems of equation, related to physical phenomena both symbolically and numerically.
- Demonstrate the ability to visualize, analyze, and interpret equations, data, and physical models.

Class Identification Number: Each of you will receive a personal identification number for this course, called a "Class ID" (CID). The purpose of this number is to protect your privacy. If you did not receive your CID by e-mail, you can obtain it from the link on the class website. Include this number—and NOT your name—on all work you turn in.

Student Email Addresses: I will periodically send class information via email to your email address that is listed under Route-Y. If that is not a current address for you, please update it.

Department Computer Accounts: Mathematica is found on all departmental computers. In case you do not already have a departmental computer account, you can gain access to these computers by following the instructions given here: http://www.physics.byu.edu/ComputerSupport/ComputerAccounts.aspx

You should seriously consider buying the student edition of Mathematica so that you can use Mathematica on your own computer. It becomes much more expensive after you graduate.

Grading: If you hit these grade boundaries, you are guaranteed to get the grade shown. I may make the grading scale easier than this in the end, if it seems appropriate, but I will not make it harder.

A	94%	B+	88%	C+	79%	D+	70%
A-	91%	B	85%	C	76%	D	67%
		B-	82%	C-	73%	D-	64%

Grades will be determined by the following weights:
- Laboratory assignments (labs 1-11): 60%
- Take-home exams: 18%
- Term project: 12%
- Final exam: 10%

Your current grade can be viewed through the class web page. Please check your scores regularly to make sure they are recorded correctly.

Laboratory assignments: During each 3-hour lab period, you are to complete the assigned lab. All labs, Lab 1 to Lab 11, are weighted equally. The labs are designed to be a combination of tutorial exercises along with additional assignments requiring more independent thought. If you get stuck on lab assignments, you are welcome to ask for help from the TAs or other students.

Passing off lab assignments. All assignments in a given lab are weighted equally. As you complete the assignments, you must get a TA to pass you off. If the TAs are unavailable when you complete a section, you can proceed on to the next section and pass off the previous section later in the lab. The TA will look at

your results, possibly ask you questions about the lab section, and record that you have completed the section. The lab scores will be entered into the computer grading system; you can then verify we have entered the correct information by checking the computer against your own record. If you complete all sections of a lab, you will get full credit. If you do not complete all of the sections, you will only get partial credit for that lab.

Completing assignments: If you do not complete all of the lab assignments during the lab, you can work on the remaining sections on your own before the next lab period. However, all of the sections must be ready for passing off at the <u>start</u> of the next lab period. For example, if you don't complete Lab 3, you can pass off the last section or sections of Lab 3 at the start of Lab 4. But <u>only</u> at the start of Lab 4.

Making up labs: If you have to miss a lab period, you have two options. (1) You can try attending one of the other 230 lab sections that week. However, the students who are enrolled in that section will have priority on the computers, so unless a student is missing or unless you have Mathematica on a laptop you can bring, you may not be able to do anything. (2) You can work through the lab on your own time and then arrive the next lab period ready to pass everything off. If you go this route, you are welcome to get help from a friend, but are on your honor to do your own work.

Take-home exams: There will be two take-home assignments which you will need to do individually. The format of these will be will similar to other take-home exams you may have had in other classes: open book, open notes, open previous work, open any reference material you can find, but closed people (including your friends, classmates, TAs, smart relatives, internet discussion boards, etc.). After you complete the problems you will email your work to me for grading.

Term Project: The term project is an opportunity for you to extend your Mathematica skills by proposing and carrying out an in-depth project. You must work with a partner. Term projects should be related to something taught in Phys 121, 123, 220, and/or an advanced physics principle taught in this course. Be creative! The project should be substantial enough that it will take you and your partner two full lab periods to complete, plus a few hours outside of class. There are three parts to the term project: a proposal, an oral presentation (the main report), and a brief final report. Due-dates are on the class schedule. Additional information, including a grading rubric, can be found on the class website.

Final exam: There will be a final exam, to be given in class during the regularly-scheduled final exam time.

BYU Policies:
Prevention of Sexual Harassment: BYU's policy against sexual harassment extends to students. If you encounter sexual harassment or gender-based discrimination, please talk to your instructor, or contact the Equal Opportunity Office at 801-422-5895, or contact the Honor Code Office at 801-422-2847.

Students with Disabilities: BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have any disability that may adversely affect your success in this course, please contact the University Accessibility Center at 801-422-2767, room 1520 WSC. Services deemed appropriate will be coordinated with the student and your instructor by that office.

Children in the Classroom: The serious study of physics requires uninterrupted concentration and focus in the classroom. Having small children in class is often a distraction that degrades the educational experience for the entire class. Please make other arrangements for child care rather than bringing children to class with you. If there are extenuating circumstances, please talk with your instructor in advance.