## Preliminary Course Syllabus

**Physics 116C Spring 2006**  
*Introduction to Computer-Based Experiments in Physics*  
Rev. April 1, 2006

**Class meets** MWF 1:10-2:00 PM in 158 Roessler  
**Lab meets** W 3:10-6:00 PM in 152 Roessler.

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Topics/Notes</th>
<th>Lab</th>
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| 0    | (Mar 27) | **First day of class** is Wed., March 29  
Course Overview, LabVIEW Intro.  
(*Cesar Chavez Day holiday Friday*) | 0: Lab computers  
*available for LabVIEW exercises: Essick Ch. 1* |
| 1    | Apr 3  | Introduction to statistics | 1: LabVIEW exercises in Essick Ch. 2-4;  
*(may begin Geiger Counter)* |
| 2    | Apr 10 | Error analysis; radioactive decay, Geiger counters, etc. | 2: Geiger Counter and counting statistics; Ch. 5-7 |
| 3    | Apr 17 | Least squares fits, Chi-square dist’n, confidence intervals; **Quiz 1** Friday | 3: Radioactive decay and mean life; Ch. 8,9 |
| 4    | Apr 24 | DAQ hardware, A/D, D/A conversion  
Sampling theorem, FFT, freq. spectra | 4: Digital Oscilloscope, Spectrum Analyzer, Ch. 10 |
| 5    | May 1  | PID process control  
**MT Exam** on Friday, May 5 | 5: Digital thermometer,  
PID Controller, Ch. 11 |
| 6    | May 8  | Signal sources, grounding, shielding  
Digital filters (intro.) | 6: PID Controller |
| 7    | May 15 | Noise spectra, Johnson Noise | 7: Johnson Noise |
| 8    | May 22 | Data busses, transmission lines  
**Quiz 2** on Friday, May 26 | 8: Johnson Noise |
| 9    | May 29 | **Memorial Day holiday on Monday**  
GPIB and instrument control (Ch. 12) | 9: Adv. Lab (*tentative*) |
| 10   | June 5 | Other DAQ systems | 10: Adv. Lab (*tentative*) |

**Last 116C class** is Wed., June 7

**Final Exam:** Monday, June 13, 1:30 PM - 3:30 PM
Instructor: David Pellett
Office: Rm. 337 Physics
Office Hours: TBA in Rm 152 Physics or by appointment.
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Office Hours: TBA in Room 152 Roessler
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Texts:
Required:
  Essick, Advanced LabVIEW Labs
  National Instruments, LabVIEW Student Edition (includes software)
  Bevington and Robinson, Data Reduction and Error Analysis for the Physical Sciences

References: (to be placed on reserve in Shields library)
  Melissinos and Napolitano, Experiments in Modern Physics, 2nd Ed.
  Horowitz and Hill, The Art of Electronics, 2nd Ed. (required text for Physics 116B)
  Squires, Practical Physics, 4th Ed.
  Johnson and Jennings, LabVIEW Graphical Programming, 3rd Ed.
  Hamming, Digital Filters
  Press et al., Numerical Recipes in C (Sec’s 14.0, 14.1, 14.3, 15)

Course Description: Physics 116C introduces techniques for making physical measurements using computer-based instrumentation. We use the LabVIEW programming system, which finds wide application in physics (and other) labs. Self-study exercises in the text by Essick using LabVIEW Student Edition on your own computer will introduce LabVIEW in the first 6 weeks of the course. The TA will check your progress in the lab. Other relevant topics will be introduced as described in the course outline on the previous page and on the class web page. The lab includes physics experiments utilizing these techniques which will require complete reports. Some information on recording data in lab and making a suitable report of the experimental results (including proper graphs) is given in Part 3 of Practical Physics by Squires, on reserve in the library (see reserve book list, above).

Prerequisites: Physics 9D, 116B, Math 22AB or consent of department

Grading: Quiz 1, 7%; MT, 14%; Quiz 2, 7%; Lab, 38%; HW, 10%; Final, 24%.