Physics 121: Course Outline
Winter Quarter, 2010
Website: physics.ucsd.edu/~tmurphy/phys121/

Week 1: (Jan. 5)
• Course introduction, structure, goals.
• Machining and mechanical design
• LAB: SolidWorks Tutorial, and example part design/drawing
• Properties of materials

Week 2: (Jan. 12)
• Mechanics of materials: stress and strain; kinematic design
• LAB: SolidWorks design and analysis of flexure
• Thermal properties of materials

Week 3: (Jan. 19)
• Thermal calculations; RTDs; test suite for lab component
• LAB: construction/testing of thermal enclosures
• Introduction to geometrical optics

Week 4: (Jan. 26)
• Raytracing optical systems; C-program for raytracing
• LAB: Optical raytracing via C-program
• Vacuum systems and related calculations

Week 5: (Feb. 2)
• Cryogenics
• LAB: Cryogenic/Vacuum lab tours
• AC vs. DC; transmission schemes

Week 6: (Feb. 9)
• Electronics: loads; diodes & LEDs; transistors; power supplies
• LAB: Power supply construction/testing
• Op-amps and their magic rules

Week 7: (Feb. 16)
• Op-amp applications; digital/analog converter using op-amps
• LAB: Op-amp circuits & D/A converter construction
• Computer interfaces: parallel; serial; GPIB; example experiment

Week 8: (Feb. 23)
• C programming HOW-TO (compilation; prep. for parallel port)
• LAB: D/A converter from parallel port interface
• C programming: functions and arrays

Week 9: (Mar. 2)
• Data streams & parameters; magswipe; flip-flops; other digital goodies
• LAB: magnetic swipe data stream and packaging to RS-232
• Data acquisition

Week 10: (Mar. 9)
• C programming examples of RS-232
• LAB: magnetic swipe interface via RS-232
• Things we missed in this course

Final Exam: Thursday, March 18, 3:00 PM; WLH-2123 (classroom)

Grading Scheme

• 80% on lab performance and associated reports
• 20% based on final exam
Required Textbook:
Text: *Building Scientific Apparatus, 3rd or 4th edition*, by Moore, Davis, and Coplan

Class Meeting Times:
Lecture: Warren Lecture Hall (WLH) 2123, TTh 2:00–3:20 PM
Lab: Warren Lecture Hall (WLH) 2120, W 2:00–6:00 PM

Professor Contact and Office Hours:
Professor: Tom Murphy
e-mail: tmurphy@physics.ucsd.edu
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Hours: Monday 4:00–5:00 PM (e-mail first so I anticipate visit), or by appointment

Teaching Assistant:
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Office: WLH 2120 (lab)
Hours: Monday and Tuesday 3:30–4:30 PM, or by appointment