Week 1: (Jan. 10)  
• Course introduction, structure, goals.  
• Machining and mechanical design  
• LAB: SolidWorks Tutorial, and example part design/drawing  
• Properties of materials

Week 2: (Jan. 17)  
• Mechanics of materials: stress and strain; kinematic design  
• LAB: SolidWorks design and analysis of flexure  
• Thermal properties of materials

Week 3: (Jan. 24)  
• Thermal calculations; RTDs; test suite for lab component  
• LAB: construction/testing of thermal enclosures  
• Introduction to geometrical optics

Week 4: (Jan. 31)  
• Raytracing optical systems; C-program for raytracing  
• LAB: Optical raytracing via C-program  
• Vacuum systems and related calculations

Week 5: (Feb. 7)  
• Cryogenics  
• LAB: Cryogenic/Vacuum lab tours  
• AC vs. DC; transmission schemes

Week 6: (Feb. 14)  
• Electronics: loads; diodes & LEDs; transistors; power supplies  
• LAB: Power supply construction/testing  
• Op-amps and their magic rules

Week 7: (Feb. 21)  
• 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. 28)  
• 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. 6)  
• Data streams & parameters; magswipe; flip-flops; other digital goodies  
• LAB: magnetic swipe data stream and packaging to RS-232  
• Data acquisition

Week 10: (Mar. 13)  
• C programming examples of RS-232  
• LAB: magnetic swipe interface via RS-232  
• Things we missed in this course

Final Exam: Thursday, March 22, 3:00 PM; WLH-2114 (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) 2114, TTh 2:00–3:20 PM
Lab: Mayer Hall Addition (MHA) 3544/3574, W 2:00–6:00 PM

Professor Contact and Office Hours:

Professor: Tom Murphy

  e-mail: tmurphy@physics.ucsd.edu
  Phone: 858.534.1844
  Office: SERF Building, Room 336 (building number 930)
  Hours: Monday 4:00–5:00 PM (e-mail first so I anticipate visit), or by appointment

Teaching Assistant:

  TA: Travis Wong
  e-mail: tjwm13@gmail.com
  Office: MHA 3544 (lab)
  Hours: Monday 10:00–11:00 AM, Tuesday 3:30–4:30 PM