國立清華大學

物理化學研究技術

11110CHEM546000

(Experimental Techniques in Physical Chemistry)

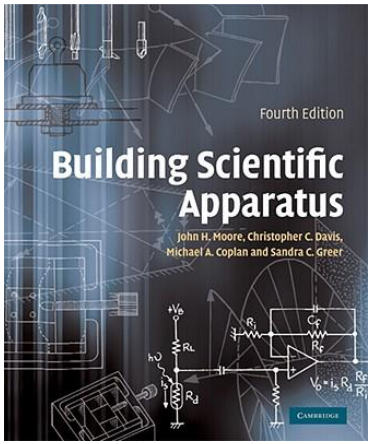
(T3T4) 10:10-12:00 Tuesday & (F2) 9:00-9:50 Friday

Rm. 325 at Chem. Bldg.

Credits: 3

Li-Kang Chu 朱立岡

Textbook: *Building Scientific Apparatus*, 4th Ed., John H. Moore, Christopher C. Davis, Michael A. Coplan, and Sandra C. Greer



Syllabus

- Mechanical design (3 hrs)

(9/13, 9/16)

- Vacuum system (9 hrs)

(9/20, 9/23, 9/27, 9/30, 10/4, 10/7)

- Optics (18 hrs)

(10/11, 10/14, 10/18, 10/21, 10/25, 10/28, 11/1, 11/4, 11/8, 11/11, 11/15, 11/18)

- Charged particles (9 hrs)

(11/22, 11/25, 12/2, 12/6, 12/9)

- Electronics (12 hrs)

(12/13, 12/16, 12/20, 12/23, 12/27, 12/30, 1/3, 1/6)

- Oral presentation

(1/10, 1/13)

Mechanical Design & Fabrication

- Tools
- Materials
- Joining materials
- Mechanical drawing
- How to use a vernier ruler

Vacuum System

- Gas properties, gas flow, and pressure measurements
- Pumps and hardware
- Gaseous sample injection
- Vacuum system design
- Molecular beam

Optics

- Basic concepts
  - Characterization of optical systems
  - Optical components & materials
- Light Sources
  - Incoherent sources
  - Coherent sources: lasers
- Detectors
- Spectrometers
  - Dispersive types & the components
  - Interferometers
- Other accessories
- Spectroscopic methods

Charged Particles

- Basic concepts
  - Particles moving in B and E fields
  - Electrostatic lens
- Particle sources
  - Electron
  - Molecular ions
- Energy analyzer
- Mass spectrometer

Electronics

- Elements
- Simple circuits
- Amplifier & frequency response
- Oscilloscope
- Analog-to-digital converter
- Electronic equipment

Evaluation

◆ Homework

- Mechanical design + Vacuum 30 %
- Optics 35 %
- Charged particles + Electronics 20 %

*抄襲，抄人和被抄，該次作業皆0分

◆ Oral presentation (10 min) 15 %

* The topics will be announced later.