國立清華大學

物理化學研究技術

11210CHEM546000

(Experimental Techniques in Physical Chemistry)

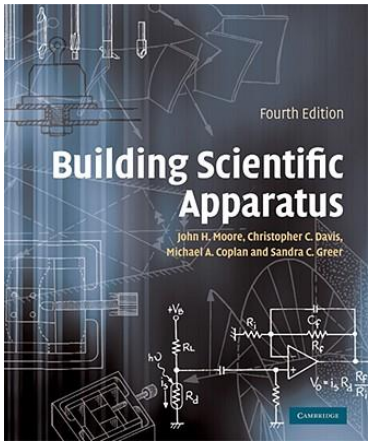
(T3T4) 10:10-12:00 Tuesday & (F2) 9:00-9:50 Friday

Rm. 326 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)

(9/12, 9/15)

- Vacuum system (9 hrs)

(9/19, 9/22, 9/26, 10/3, 10/6, 10/13)

- Optics (18 hrs)

(10/17, 10/20, 10/24, 10/27, 10/31, 11/3, 11/7, 11/10, 11/14, 11/17, 11/21, 11/24)

- Charged particles (8 hrs)

(11/28, 12/1, 12/5, 12/8, 12/12)

- Electronics (10 hrs)

(12/15, 12/19, 12/22, 12/26, 12/29, 1/2, 1/5)

- Oral presentation

(1/9, 1/12)

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.