

AL FISCHER

# CHEM 370 LECTURE MATERIAL



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# Course Information

## *Course Website, Syllabus, & Lab Manual*

- [alphonse.github.io/chem370](https://alphonse.github.io/chem370)

## *Books Referenced Herein*

- **“Harvey”**: Harvey, D. *Analytical Chemistry 2.1* Available on Chemistry LibreTexts
- **“Granger”**: Granger, R.M, H.M. Yochum, J.N. Granger, and K.D. Sienerth. *Instrumental Analysis* (Revised First Edition). Oxford University Press. ISBN: 9780190865337 (Rental Book, available in WCU Bookstore)

## *Topics/Readings*

### **Part I: Foundations**

- Granger Chapter 1 (toolbox)
- Harvey Chapters:
  - 1 (intro)
  - 2, 3 (tools, vocabulary)
  - 4 (data evaluation)
  - 5 (standardization)
- Granger Chapter 22 (statistical data analysis)

### **Part II: Spectroscopy**

- Granger Chapters:
  - 2 (intro)
  - 3 (optics)
  - 6 (UV-vis)
  - 8 (luminescence)
  - 11 (FT-IR)
  - 7, 9 (atomic)

### **Part III: Mass Spectrometry**

- Granger Chapter 13

### **Part IV: Separations**

- Granger Chapters 15 and 16 (LC & GC)

### **Part V: Special Topics**

- TBD (SEM/TEM, CRD, PAS)

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## **Part I**

# **Foundations**





# ***1***

## ***The Analyst's Toolbox***

Harvey Chapter 1: Introduction to Analytical Chemistry

### ***1.1 The Analyst's Toolbox***



## 2

# *Analytical Tools*

### *Prepare*

- **Read:** Harvey Chapter 2: Basic Tools of Analytical Chemistry
- **Read:** Harvey Chapter 3: The Vocabulary of Analytical Chemistry

### *2.1 How is Analytical Chemistry taught?*

- Quant + Instrumental
- Instrumental (incl. Quant)

### *Prepare*

- **Read:** Harvey Chapter 4: Evaluating Analytical Data
- **Read:** Granger Chapter 22: Statistical Data Analysis



# 3

## *Reproducible & Open Reserch*

We will focus on reproducible data analysis.

What does this mean?

- <https://ropensci.github.io/reproducibility-guide/sections/introduction/>
- <https://book.fosteropenscience.eu/en/020penScienceBasics/>
- <http://faculty.nps.edu/rdfricke/0A3101/Lab%201.pdf>



# 4

## *Signals and Noise*

- Read Granger Ch. 5





# 5

## *Calibration and Quality Assurance*

*Prepare*

- **Read:** Harvey Chapter 5: Standardizing Analytical Methods



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## *Instrument Survey*

- FAAS
- GCMS
- HPLC



## **Part II**

# **Spectroscopy**



# 7

## *Spectroscopy*

- Read Granger Ch 2 (partial?)

**Spectrum** (singular) vs. **Spectra** (plural) vs. **Spectrometer** (an instrument) vs. **Spectroscopist** (a person)

- *Vignette*: Spectroscopy and the Ozone Layer





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## *UV-Vis Spectroscopy*

- Read Granger Ch 6



# 9

## *Luminescence Spectroscopy*

- Read Granger Ch 8



*10*

## *FT-IR Spectroscopy*

- Read Granger Ch 11



**11**

## *Atomic Spectroscopy*

- Read Granger Ch 7, 9





## **Part III**

# **Spectrometry**



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## *Mass Spectrometry*

- Read Granger Ch 13

**Spectrum** (singular) vs. **Spectra** (plural) vs. **Spectrometer** (an instrument) vs. **Spectrometrists** (a person)



## **Part IV**

# **Separations**



13

*Separations*





*14*

## *Liquid Chromatography*

- Read Granger Ch 15



15

## *Gas Chromatography*

- Read Granger Ch 16



## **Part V**

# **Special Topics**



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## *Special Topics*

- TBD (SEM/TEM, CRD, PAS)