

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
FALL 2016

COURSE: CHEMISTRY 515 – Advanced Instrumental Analysis

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	09:00-09:50	SA 147 (SA 205)	Dr. Osthoff	SB 205	220-8689	hothoff@ucalgary.ca	TWRF 12-1

TEXTBOOKS:

"Building Scientific Apparatus", **J.H. Moore** et al., Cambridge University Press, 4th ed. (2009).

"Principles of Instrument Analysis", **D.A. Skoog** et al., Brooks Cole, 6th ed. (2006).

"Quantitative Chemical Analysis", **D.C. Harris**, Freeman, 9th ed. (2016).

"Hands-on Introduction to LabVIEW™ for Scientists and Engineers", **J. Essick**, Oxford University Press, 3rd ed. (2016).

TOPICS COVERED AND SUGGESTED READING:

	Skoog (6th ed.)	Moore (4th ed.)	Harris (9th ed.)	Essick (3rd ed.)
Generalized Instrumentation, Figures of Merit	Chapter 1	-	Chapter 1-5	-
Evaluation of Analytical Data (Review) and Statistics of Linear Regression and Calibration Curves	Chapter 1 Appendix 1	-	Chapter 1-5	-
Electrical Circuit Components and Circuits	Chapter 2	Chapter 6.1-6.3	-	-
Operational Amplifiers in Chemical Instrumentation	Chapter 3ABCE	Chapter 6.4	-	-
Digital electronics, Concepts in digital Measurements	Chapter 4ABC	Chapter 6.6	-	-
Introduction to data acquisition and instrument control	-	Chapter 6.7	-	Chapter 5, 12-13
Introduction to Labview™	-	-	-	Chapter 1-3, 6-8
Introduction to Microsoft Excel®	-	-	see pp. xii-xiii	-
Signals and noise	Chapter 5	Chapter 6.8	Chapter 3; 20-6	-
Spectroscopy - components of optical instruments (sources, wavelength selection)	Chapter 6 (review) Chapter 7ABC	Chapter 4.1-4.3, 4.5-4.8	Chapter 18	-
UV, visible, and near infrared spectroscopy	Chapter 13	Chapter 4.7	Chapter 19-20	-
Atomic Absorption and Emission Spectroscopy	Chapter 9, 10A	-	Chapter 21	-
Fourier Transform (FT) Instruments and FTIR spectrometers	Chapter 7I, 16 BI	Chapter 4.7.6	Chapter 20-5	Chapter 11
Mass spectrometry	Chapter 11ABC; 20	Chapter 5.4; 5.5	Chapter 22	-
Separations	Chapter 26	-	Chapter 23	-
GC	Chapter 27	-	Chapter 24	-
HPLC	Chapter 28A-G	-	Chapter 25	-

List of Laboratory Experiments

Expt. 1: Introduction to data acquisition with National Instruments Labview and Analog Discovery 2

Expt. 2: Determination of alcohols in a bourbon sample by gas chromatography with flame ionization detection

Expt. 3: Spectrophotometric analysis of caffeine and benzoic acid in a soft drink

Expt. 4: Analysis of food additives in a "diet" caffeinated soft drink by reversed-phase high-performance liquid chromatography

Expt. 5: Analysis of drugs of abuse by gas chromatography with mass spectrometric detection

Expt. 6: Quantification of major anions in a water sample by ion chromatography with indirect UV detection

Expt. 7: Analysis of lead content in a wine sample by graphite furnace atomic absorption spectroscopy

Expt. 8: Analysis of metals in a rice based breakfast cereal by Inductively Coupled Plasma-Mass Spectrometry