UNIVERSITY OF CALGARY

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
FALL 2018

1. COURSE: CHEMISTRY 515 – Advanced Instrumental Analysis

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	09:00-09:50	ST 129	Dr. Osthoff	SB 205	220-8689	hosthoff@ucalgary.ca	W 12-1

Course website or Desire 2 Learn (D2L) course name: https://d2l.ucalgary.ca/d2l/home/235257
Departmental Office: SA 229, 220-5341, chem.undergrad@ucalgary.ca

2. RECOMMENDED TEXTBOOKS:

"Principles of Instrument Analysis", **D.A. Skoog** et al., Brooks Cole, 6th ed. (2006); Cengage 7th ed. (2018).

"Instrumental Analysis", **R.M. Granger** et al., Oxford University Press, Revised Edition (2017).

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

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

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

"Communicating Science: An Introductory Guide", **R. Jensen**, RoguePublishing.ca (2016).

3. LIST OF LABORATORY EXPERIMENTS:

Expt. 1: Determination of alcohols in a bourbon sample by gas chromatography with flame ionization detection

Expt. 2: Spectrophotometric analysis of caffeine in a soft drink

Expt. 3: Analysis of food additives in a caffeinated soft drink by reversed-phase high-performance liquid chromatography and diode array detection

Expt. 4: Analysis of drugs of abuse by gas chromatography with mass spectrometric detection

Expt. 5: Quantification of major anions in a water sample by ion chromatography with indirect UV detection

Expt. 6: Analysis of trace metals in a wine sample by graphite furnace atomic absorption spectroscopy

Expt. 7: Analysis of trace metals in drinking water and wine by Inductively Coupled Plasma-Mass Spectrometry

Expt. 8: Data acquisition with National Instruments Labview and Analog Discovery 2

4. TOPICS COVERED AND SUGGESTED READING:

	Skoog (6th ed.)	Skoog (7th ed.)	Granger (2017 ed.)	Moore (4th ed.)	Harris (9th ed.)	Essick (3rd ed.)
Generalized Instrumentation, Figures of Merit	Ch. 1	Ch. 1	Ch. 1.2	-	Ch. 1-5	-
Evaluation of Analytical Data (Review) and Statistics of Linear Regression and Calibration Curves	Ch. 1 Appendix 1	Ch. 1 Appendix 1	Ch. 22	-	Ch. 1-5	-
Electrical Circuit Components and Circuits	Ch. 2	Ch. 2	Ch. 4.1-4.4, 4.6	Ch. 6.1-6.3	-	-
Operational Amplifiers in Chemical Instrumentation	Ch. 3ABCE	Ch. 3	Ch. 4.5	Ch. 6.4	-	-
Digital electronics, Concepts in digital Measurements	Ch. 4ABC	Ch. 4	Ch 4.7	Ch. 6.6	-	-
Introduction to data acquisition and instrument control	-	-	-	Ch. 6.7	-	Ch. 5, 12-13
Introduction to Labview™	-	-	-	-	-	Ch. 1-3, 6-8
Introduction to Microsoft Excel®	-	-	-	-	pp. xii-xiii	-
Signals and noise	Ch. 5	Ch. 5	Ch. 5	Ch. 6.8	Ch. 3; 20-6	-
Spectroscopy - components of optical instruments (sources, wavelength selection)	Ch. 6 (review) Ch. 7ABC	Ch. 6-7	Ch. 3	Ch. 4.1-4.3, 4.5-4.8	Ch. 18	-
UV, visible, and near infrared spectroscopy	Ch. 13	Ch. 13-14	Ch. 1.2, 6	Ch. 4.7	Ch. 19-20	-
Atomic Absorption and Emission Spectroscopy	Ch. 9, 10A	Ch. 9-10	Ch. 7, 9	-	Ch. 21	-
Fourier Transform (FT) Instruments and FTIR spectrometers	Ch. 7I, 16 BI	Ch. 7, 17	Ch. 11	Ch. 4.7.6	Ch. 20-5	Ch. 11
Mass spectrometry	Ch. 11ABC; 20	Ch. 11ABC; 20	Ch. 13	Ch. 5.4, 5.5	Ch. 22	-
Separations	Ch. 26	Ch. 26	Ch. 15.1, 15.2	-	Ch. 23	-
GC	Ch. 27	Ch. 27	Ch. 16	-	Ch. 24	-
HPLC	Ch. 28A-G	Ch. 28	Ch. 15.3-15.5	-	Ch. 25	-

Department Approval: Approved by Department Head Date: August 30, 2018