

**UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF CHEMISTRY  
COURSE SYLLABUS  
FALL 2019**

**1. Course: CHEMISTRY 629.91- Selected Topics in Inorganic Chemistry: Synchrotron-based X-ray spectroscopy**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	TR	9:30-10:45	SA 243	Dr. F. Jalilehvand	SB 213	<a href="mailto:faridehj@ucalgary.ca">faridehj@ucalgary.ca</a>	By Appointment

Course Desire 2 Learn (D2L) site ([d2l.ucalgary.ca](http://d2l.ucalgary.ca)): CHEM 629 L01 – Selected Topics in Inorganic Chemistry

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To avoid IT problems, it is recommended that the students use their U of C account for all course correspondence.

**2. Course Description:** The main focus of this course is synchrotron-based X-ray absorption spectroscopy from theory to data analysis, and related techniques, as well as an introduction to X-ray powder diffraction.

**3. Recommended Textbooks:** The following materials are recommended for reading:

A) "Reserved Books" in the U of C Library:

1) Bunker, G. "Introduction to XAFS: a practical guide to X-ray absorption fine structure spectroscopy", **2010**, Cambridge University Press; 2) Koningsberger, D.C. " X-ray absorption spectroscopy: principles, applications, techniques of EXAFS, SEXAFS and XANES", **1987**, Wiley; 3) Teo, B. K. "EXAFS: basic principles and data analysis", **1986**, Springer-Verlag; 4) Duke, P. J. "Synchrotron radiation: production and properties", **2000**, Oxford University Press; 5) Jenkins, R. "Introduction to X-ray powder diffractometry", **1996**, Wiley.

B) Willmott, P. R. "An introduction to synchrotron radiation : techniques and applications", 2011, John-Wiley (available On-line from library's website)

C) Jalilehvand, F; Ph.D. Thesis, 2000 (hard copy available as loan at SB 213)

**4. Topics Covered:**

Interaction of light with matter; X-ray sources

Synchrotron radiation and instrumentation

X-ray absorption spectroscopy (EXAFS, XANES): principles, experimental aspects and applications

Crystalline systems, unit cells, Miller indices

X-ray powder diffraction and its applications

*The following topics will be presented by the students:*

X-ray Fluorescence Microscopy: Theory, instrumentation and applications

X-ray Emission Spectroscopy: Theory, instrumentation and applications

X-ray Raman Scattering: Theory, instrumentation and applications

**5. Hands-on sessions:**

EXAFS data analysis using the WinXAS program; Visualizing crystal structures using the Diamond program