CHEM-678
Structure and Properties of Surfaces
Spring 2015
Syllabus

February 10	Introduction. Surface science and its subjects. Vacuum. Vacuum pumps. Vacuum measurement.
February 17	Surface structure of single crystals. Diffraction methods. Low energy electron diffraction.
February 24	Surface atoms and surface concentration. Auger electron spectroscopy and X-ray photoelectron spectroscopy.
March 3	AES - Laboratory
March 10	Mass spectrometry and thermal desorption. Thermodynamics and kinetics of surface reactions.
March 17	Laboratory work on mass spectroscopy and thermal desorption.
March 24	Vibrational spectroscopy and vibrational spectroscopy laboratory
March 31	Spring Break
April 7	Microscopic analytical techniques
April 14	Theoretical surface chemistry
April 21	Theoretical surface chemistry
April 28	Theoretical surface chemistry
May 5	Student Presentations
May 12	Student presentations and review for the final exam.
Finals week	Take-home final exam, 24 hours window

Text: The course will be based on several books, scientific publications and other materials. The principle text is: "Practical Guide to Surface Science & Spectroscopy" by Yip-Wah Chung (Academic Press, 2001) but it is not required. Other well known surface chemistry textbooks will be helpful.

Other Useful Textbooks:

1) Arthur W. Adamson and Alice P. Gast “Physical Chemistry of Surfaces”, 6th edition, 1997.
2) Gabor A. Somorjai, “Introduction to Surface Chemistry and Catalysis”, John Wiley & Sons, Inc., New York 1994.
3) Kurt W. Kolasinski, “Surface Science. Foundations of Catalysis and Nanoscience”, John Wiley & Sons, Inc., London 2002.

Narrative: The course will cover structure and chemical properties of solid surfaces. It will involve lectures and laboratory work in a surface science facility of Professor Teplyakov. Lectures will be followed by practical applications of surface analytical techniques and computational experiments using density functional theory.

Prerequisites: Undergraduate level physical chemistry courses. This course will be based on general physical chemistry concepts in kinetics, thermodynamics, and spectroscopy.

Restrictions: Students from the departments other that Chemistry and Biochemistry, Physics, Chemical and Biomolecular Engineering, Materials Science and Engineering, and Plant and Soil Sciences should seek the permission of instructor before registering.