Syllabus Spring 2016
Chemistry 527 Analytical Chemistry of Surfaces

MWF 12-12:50 pm
Room  146 Park Hall

Professor Joe Gardella
470 NS Complex
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645-1499

Course Description

This course is meant to introduce methods of surface analysis and their applications within a framework that includes a problem solving approach to complex real world systems. The course is divided into three areas, formal lecture material, teamwork based problem sets assignments and oral presentation/ research review paper. The grading will be based on two exams (both take home), problem sets (a shared team grade which the class will assign) and the presentation and review paper. The material to be covered in lecture will cover electron spectroscopy and related imaging methods, optical spectroscopies and ion and mass spectrometric and microscopioc methods as they are applied to the determination of surface chemistry. The applications of these methods will be developed through the problem sets and the review papers. Topics such as catalysis, corrosion, adhesion, semiconductor materials, biomaterials, electrochemical surfaces, polymers, membranes and others of interest to the class will be discussed.

Learning Goals and Outcomes

successful work in this course will involve the following learning outcomes:

· Advanced understanding of surface chemical analysis and surface chemistry
· A strong understanding of the instrumentation and physics of measurement for electron spectroscopy, mass and ion spectrometry and vibrational spectroscopy of surfaces
· Develop research skills
· Develop critical thinking

These outcomes will be met by the combination of successful completion of take home midterm and final exams, a final research paper and practical work in homework applications of methodology, along with classroom presentations on your papers and homework and your classroom discussion and participation.

Resource Material/Text

The required text for this course is: Surface Analysis - The Principal Techniques 2nd Edition (2009) edited by John C. Vickerman and Ian Gilmore. Information on other text materials will be available in class. You may wish obtain this from Amazon. Here is a link.

In addition UB Science Librarian Ben Wagner has produced a resource listing of other e-books and articles available in the Science and Engineering Library.

Grading Requirements

**Those students auditing the course will be expected to participate in the group problem solving sessions and present an oral review paper.** The grading will be based on an absolute total of 1000 points, distributed as follows.

Problem Set Team Grades ........................................................................................................ 200 points
Oral Review Presentation ..................................................................................................... 200 points
Submitted Review Paper ..................................................................................................... 200 points
Mid-term Exam .................................................................................................................. 100 points
Final Exam ........................................................................................................................... 300 points
Total ..................................................................................................................................... 1000 points

Academic Integrity

Students in the course are subject to the University’s Integrity policy ([http://undergradcatalog.buffalo.edu/policies/course/integrity.shtml](http://undergradcatalog.buffalo.edu/policies/course/integrity.shtml)). Please familiarize yourself with this.

Students with Disabilities

Disabled students may seek accommodations for testing, and any in-class needs. The course leaders are especially concerned that ANY student needed accommodations be fully served. The UB Disability services office provides a registration system and a list of procedures ([http://www.student-affairs.buffalo.edu/ods/](http://www.student-affairs.buffalo.edu/ods/)) Please consult with them if you have any disability or educational need that might require accommodations.
# Lecture/Meeting Schedule

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<th>Lecture Topic (s)</th>
<th>Assignment</th>
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<td>Molecular and Atomic Surface Structure; Surface Chemical Reactions; Method Overview Imaging and Microscopy Instrumentation</td>
<td>Form Groups</td>
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<tr>
<td>2</td>
<td>Jan 27</td>
<td>XPS/ESCA Principles</td>
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<td>3</td>
<td>Jan 29</td>
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<td>Choosing Surface Anal. Methods</td>
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<td>XPS Instrumentation</td>
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<td>Feb 12</td>
<td>XPS Qual/Quant/Inst Homework Groups</td>
<td>Measuring Surface Concentrations</td>
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<td>Feb 15</td>
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<td>Feb 17</td>
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<td>Feb 19</td>
<td>Auger Principles and Qualitative Analysis, Homework Groups</td>
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<td>Auger Surface Concentrations</td>
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<td>Take Home Midterm Handout</td>
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<td>Quantitative Depth Profiling by Auger/XPS</td>
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<td>Low Energy Ion Scattering Homework Groups</td>
<td>Depth Profiles of Buried Interfaces</td>
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<td>Mar 14-18</td>
<td>SPRING BREAK</td>
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<td>Low Energy/High Energy Ion Scattering</td>
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<td>Rutherford Backscattering Spectrometry</td>
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