

Special Topics in Physical Chemistry
(Surface Science on Nanomaterials)

CHM 6580

Spring 2019

Class Meeting Times: T 7-8(1:55-3:50pm) MAT 0107
Th 8(3:00-3:50pm) MAT 0107

Instructor: Dr. Wei David Wei

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Office Hours: T: 11:00-11:50pm
Th: 2:00-2:50pm or by appointment

Office Location: CLB 311D

Grading Criteria: (30%) Class participation, quizzes, and in-class discussions
(20%) Problem sets
(20%) Term paper and group work
(30%) Final presentation

Scheme: 100-90%(A); 89-85%(A-)
84-80%(B+); 79-75%(B); 74-70%(B-)
69-67%(C+); 66-64%(C); 63-60%(C-)
59-57%(D+); 56-54%(D); 53-50%(D-)
<50% (F)

Holidays (no class): Mar 4-8 (Spring Break)

Tests: No final exam
Quizzes and Problem sets in class

Class Text: Materials will be provided. No required textbook for the course. We will be working from selected book chapters, handouts, review articles and research papers, distributed electronically. However, there are many excellent texts

that treat various aspects of the course and will be helpful in gaining a better understanding and in preparation of the term papers. Extra recommended reading materials are:

Kolasinski, Surface Science: Foundations of Catalysis and Nanoscience

Hornyak Gabor L., Introduction to Nanoscience & Nanotechnology

O'Connor, Sexton, Surface Analysis Methods in Materials Science

Somorjai, Introduction to Surface Chemistry and Catalysis

Course Objectives: Understand chemical and physical phenomena particular to surfaces and interfaces of nanomaterials

Introduction to modern surface science methods and their application to current research topics on nanomaterials.

Critical interpretation of surface analysis data and surface science research reports.

Term paper will be 4-6 pages to present a surface analysis method not discussed in class or discuss a modern problem or novel material that has been addressed or characterized using a combination of techniques. The papers will be peer-reviewed by two of your classmates before final "submission" on the last day of class. Short presentations (~30min.) will take place in the last weeks of the semester. More details on this later.

Attendance is absolutely mandatory and participation in class discussion is a very important part of the course. A key objective of the course is critical reading and interpretation of surface analysis data and papers. All will be done in the class. If you must miss class, please contact me in advance.

Since exams are during normal class hours, make-up exams are granted **solely at the discretion of the instructor**. Any request for make-up exams should have a legitimate excuse, and be made to Dr. Wei no later than 1 week prior to the exam date. Students should also familiarize themselves with the UF Student Honor Code posted on the web at www.chem.ufl.edu/~itl/honor.html. Students with disabilities must first register with the Dean of Students Office; the Dean of the Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

The following is a tentative schedule for the semester. All aspects of this schedule are subject to change, but we will try to keep on schedule.

Introductions
Kinetic theory of gases
Ultra-high vacuum
Surface Structures
Low-energy electron diffraction
Adsorption
Diffusion and growth at surfaces
Overview of surface analytical methods
Nanoscience and nanotechnology
Thermal desorption spectroscopy
Reactions at surfaces
Thin film growth on surfaces
Scanning probe microscopy overview
AFM
SEM
STM
SNOM

Vibrational spectroscopy overview
IR
Spring break
Spring break
SERS
HREELS
Surface composition analysis
Electron/ion energy analyzers
Excitation sources
XPS
AES
SEM/EDX
Surface photoemission spectroscopy
UPS and 2PPE
Student presentations
Student presentations
Student presentations