



Course Syllabus: Advanced Topics in Chemistry - ChemS 390

Division	Physical Science and Engineering Division
Course Number	ChemS 390
Course Title	Advanced Topics in Chemistry
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	04:00 PM - 05:30 PM Sun Thu

Instructor(s)				
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Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	This course focuses on advanced and special topics in chemistry: organocatalysis, supramolecular chemistry, and crystallography.
Course Description from Program Guide	The advanced topics class will focus on current research topics that have a direct influence on various applications including catalysis, solar energy in addition to emerging synthetic and analytical techniques for producing new generations of materials.
Goals and Objectives	The course focuses as much on the special topics in chemistry as it does on building the skill set for navigating the modern chemistry literature. The students will improve their skills in literature search and critical analysis, as well as their presentation skills.
Required Knowledge	Knowledge of fundamentals of General, Organic and Organometallic chemistry.
Reference Texts	<ol style="list-style-type: none"> 1. ACS Scifinder Scholar: https://scifinder.cas.org/ 2. Web of Knowledge: http://www.webofknowledge.com/ 3. Class materials and handouts provided by each instructor.
Method of evaluation	25.00% - Homework /Assignments 75.00% - Presentation

Nature of the assignments	Assignments for the class will consist of presentations based on original research papers.
Course Policies	<p>The highest levels of academic integrity are expected in this class. The code of student conduct will be strictly enforced.</p> <p>Proper attribution is expected when using any information from the scientific literature, textbooks, resources on the web. Lack of proper attribution or verbatim copying of content will result in an automatic <i>zero grade</i> for an <i>entire assignment</i>.</p> <p>There is no make-up for missed presentation dates, unless the instructor has been notified in advance of a valid reason for student's absence. A grade of 0 is automatically assigned for any missed presentation.</p>
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/22/2017 Thu 01/26/2017	-General Introduction to Organocatalysis, Concepts of Enamine Catalysis, alpha-Functionalization of Carbonyl Compounds -SOMO and Radical Chemistry in Organocatalysis, Concepts of Iminium Catalysis, Addition Reactions
2	Sun 01/29/2017 Thu 02/02/2017	-Tertiary Amine and Phosphine-Catalysis, Concepts and Application, Nucleophilic Catalysis, Acylations and Resolutions -MBH Reactions and Mechanistic Aspects, Epoxidations, Annulations, Carbene-Catalysis, Concepts and Redox Reactions
3	Sun 02/05/2017 Thu 02/09/2017	-Organo Lewis Acid Catalysis, Carbenium Catalysis; Asymmetric Lewis Base Catalysis, Concepts and Applications of Bifunctional Organocatalysts -Asymmetric Bronsted Acid Catalysis, Catalyst Design, Acidity vs. Reactivity Concepts, Reductions and Oxidations, Addition Reactions
4	Sun 02/12/2017 Thu 02/16/2017	-Hydrogen-Bonding Catalysis, Concepts of Multiple Bond Activation, Asymmetric Transformations, Applications and Limitations -Phase-Transfer Catalysis, Concepts and Requirements, Catalyst Design and Application in Industry, Peptide Catalysis, Strategies for Immobilizing Organocatalysts
5	Sun 02/19/2017 Thu 02/23/2017	-Introduction to supramolecular chemistry and most important types of non-covalent interactions -Modes of molecular recognition. Supramolecular synthons
6	Sun 02/26/2017 Thu 03/02/2017	-Cation recognition: from crown ethers to cryptands and siderophores -Topics in anion recognition and coordination chemistry
7	Sun 03/05/2017 Thu 03/09/2017	-Co-receptors and multiple recognition. Polyvalency. Molecular recognition in polymers -Supramolecular catalysis and reactivity. Supramolecular enzyme mimics
8	Sun 03/12/2017 Thu 03/16/2017	-Dynamic combinatorial chemistry and template-accelerated reactions -Molecular and supramolecular devices. Diagnostic applications and supramolecular therapeutics
9	Sun 03/19/2017 Thu 03/23/2017	-Introduction to crystallography; The periodic table of the elements and interatomic bonds; What is a crystal structure? Crystallographic computations-1 -Lattice planes; Reciprocal space; Crystallographic computations-2; Symmetry in crystallography
10	Sun 03/26/2017 Thu 03/30/2017	-Point groups; plane groups and space groups -X-ray diffraction: geometry, intensities; other diffraction techniques; about crystal structures and diffraction patterns
11	Sun 04/02/2017 Thu 04/06/2017	---
12	Sun 04/09/2017 Thu 04/13/2017	-Solving the structure of a KCC catalyst recently made and published-1 -Solving the structure of a KCC catalyst recently made and published-2
13	Sun 04/16/2017 Thu 04/20/2017	-Single crystal data analysis, ShelX, Diamond, Crystalmaker, CSD -Crystal growth and evaluation, data collection and solution, crystal structure refinement. Derivation of results from a solved crystal structure and data presentation
14	Sun 04/23/2017 Thu 04/27/2017	TBD
15	Sun 04/30/2017 Thu 05/04/2017	TBD

16	Sun 05/07/2017 Thu 05/11/2017	TBD
17	Sun 05/14/2017 Thu 05/18/2017	
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Note

The instructor reserves the right to make changes to this syllabus as necessary.