جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Advanced Inorganic Chemistry II - ChemS 350

Division	Physical Science and Engineering Division
Course Number	ChemS 350
Course Title	Advanced Inorganic Chemistry II
Academic Semester	Spring
Academic Year	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	09:00 AM - 10:30 AM | Sun Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Jean-Marie Maurice Basset	jeanmarie.basset@kaust.edu.sa	+966128080299	4234, 3, Ibn Sina (bldg. 3)	Open

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description

SCHEDULE per week:

1. **General Objectives of the course**
2. 18 electrons rule, pi bonding
3. Sigma bonding
4. Organometallic chemistry and catalysis: Ligands
5. Elementary steps in catalysis: oxidative addition/reductive elimination
6. Elementary steps in catalysis : sigma bond metathesis
7. Elementary steps in catalysis: Insertions reactions, beta elimination
8. Short introduction to catalytic cycle
9. Homogeneous catalysis: Carbonylation
10. Homogeneous catalysis : Hydroformylation
11. Homogeneous catalysis: Monoelectronic transfer
12. Polymerization: olefins, dienes,…
13. Heterogeneous catalysis: the various classes of catalysts
14. Heterogeneous catalysis: the flue gas depollution
15. Heterogeneous Catalysis: Energy and CO2
16. Heterogeneous Catalysis: Deactivation and regeneration

Course Description from Program Guide

Emphasis on concepts and applications of homogenous and heterogeneous catalysis and the impact of such processes on the advancement of different industries.

Goals and Objectives	The general objective of the course is to rationalize catalysis (homogeneous and heterogeneous) based on the rules of molecular organo-metallic and coodination chemistry. Those rules apply quite perfectly in the field of homogeneous and heterogeneous catalysis.
Required Knowledge	NA
Reference Texts	**RECOMMENDED TEXTBOOK:** Didier Astruc "Organometallic Chemistry" Books: -James P. Collman (Author), Richard G. Finke (Author), Jack R. Norton (Author)Principles and Applications of Organotransition Metal Chemistry [James P. *Collman*, Richard G. Finke, Jack R. Norton] on Amazon.com.(1987) -**Elschenbroich & A. salzer « Organometallics » IIed, VCH 1992** -**Gadi Rothenberg « Catalysis », VCH (2008)** -**Piet W. N.M. Van Leeuwen « Homogeneous Catalysis », Kluwer (2004)** -**Hans Niemanstsvedriet, "Spectroscopy in Catalysis" Wiley –VCH (2007)** Journals: 1. Journal of Organometallic Chemistry 2. Journal of Catalysis 3. Organometallics 4. ACS catalysis 5. ChemCatChem 6. Am. Chem. Soc. 7. Chem. Intern. Ed. 8. Phys. Chem. 9. Science 10. Cat. 11. Nature 12. Surface Science 13. Langmuir 14. Material Chemistry
Method of evaluation	**50.00**% - Exam 2 **30.00**% - Midterm exam **20.00**% - Homework /Assignments
Nature of the assignments	HOMEWORK: Special topic reading assignments Additonal homework TBD
Course Policies	**HONOR CODE** In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Academic dishonesty will result in reductions in grades and/or expulsions from this class and/or the University.
Additional Information	Dr. Jean Marie Basset Distinguished Professor of Chemistry KAUST Catalysis Center Building 3, Room 4234 Phone: 808-0329 E-mail: jeanmarie.basset@kaust.edu.sa Office Hours: By appointment (please inquire per e-mail)

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/27/2019	1. **General Objectives of the course**
1	Wed 01/30/2019	1. 18 electrons rule, pi bonding
2	Sun 02/03/2019	1. Sigma bonding
2	Wed 02/06/2019	1. Organometallic chemistry and catalysis: Ligands
3	Sun 02/10/2019	1. Elementary steps in catalysis: oxidative addition/reductive elimination
3	Wed 02/13/2019	1. Elementary steps in catalysis : sigma bond metathesis
4	Sun 02/17/2019	1. Elementary steps in catalysis: Insertions reactions, beta elimination
4	Wed 02/20/2019	1. Short introduction to catalytic cycle
5	Sun 02/24/2019	1. Homogeneous catalysis: Carbonylation
5	Wed 02/27/2019	1. Homogeneous catalysis : Hydroformylation
6	Sun 03/03/2019	1. Homogeneous catalysis: Monoelectronic transfer
6	Wed 03/06/2019	1. Polymerization: olefins, dienes,…
7	Sun 03/10/2019	1. Heterogeneous catalysis: the various classes of catalysts
7	Wed 03/13/2019	1. Heterogeneous catalysis: the flue gas depollution
8	Sun 03/17/2019	1. Heterogeneous Catalysis: Energy and CO2
8	Wed 03/20/2019	1. Heterogeneous Catalysis: Deactivation and regeneration
9	Sun 03/24/2019	Spring Break
9	Wed 03/27/2019	Spring Break
10	Sun 03/31/2019	1. Heterogeneous catalysis: Refining technology
10	Wed 04/03/2019	Revisions
11	Sun 04/07/2019	Revisions
11	Wed 04/10/2019	Revisions
12	Sun 04/14/2019	Revisions
12	Wed 04/17/2019	Revisions
13	Sun 04/21/2019	Revisions
13	Wed 04/24/2019	Revisions
14	Sun 04/28/2019	Revisions
14	Wed 05/01/2019	Revisions
15	Sun 05/05/2019	Revisions
15	Wed 05/08/2019	Revisions
16	Sun 05/12/2019	Revisions
16	Wed 05/15/2019	Revisions
17	Sun 05/19/2019	Final Exam Week
17	Wed 05/22/2019	Final Exam Week

Note

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