Course Specifications

Programme(s) on which the course is given Pre-MSc. Organic Chemistry

Major or Minor element of programmes Major

Department offering the programme Chemistry

Department offering the course Chemistry

Academic year / Level: Postgraduates

Date of specification approval: 2010

A- Basic Information

Title: Advanced Organometallic Chemistry **Code: CH6411**

Credit Hours: 2 h **Lecture: 2h/week -**
Tutorial: 0 **Practicals:0.0** **Total: 2 h**

B- Professional Information

1 – Overall Aims of Course

For students undertaking this course, the aims are to:
■ attract the interests of students with a focus on the fundamental types of organometallic reactions: ligand substitution, oxidative addition/reductive elimination, migratory insertion, attack on coordinated ligands, and the reactivity of metalacycles, carbenes, and carbynes.
■ Introduce the basic information on the important of well known organometallic reactions and applications of organotransition metal complexes in catalysis and organic synthesis.
■ provide an overview of current developments in transition metal and main group organometallic compounds and their applications in the synthesis and manufacture of high value materials (polymers, fine chemicals etc).

2 – Intended Learning Outcomes of Course (ILOs):

On completing this course, students will be able to:
a1- understanding of the main principles of organometallic chemistry and the synthesis, structure and reactivity of organometallic complexes
a2- explores the basic types of organometallic reactions, namely substitution, oxidative addition, migratory insertion, reductive elimination and salt elimination.
a3. be familiar with research methods in organometallic chemistry.

1. Intellectual Skills

On completing this course, students will be able to:

b1- Building the students capability by determination of the reactivity of organometallic compounds.
b2-Improve the capability of thinking of student with field of organometallic chemistry.

Professional and Practical Skills: No practical or tutorial hours

d- General and Transferable Skills: On completing this course, students will be able to:

d1- work effectively both in a team, and independently on solving problems.
d2- use IT and search for information.
d3- communicate effectively with his teacher and colleagues.

Course contents

Topics actually taught	No. of hours	Lecture	Tutorial/Practical
1- An introduction to organometallic chemistry ligand substitution, oxidative addition/reductive elimination, migratory insertion, attack on coordinated ligands, and the reactivity of metalacycles, carbenes, and carbynes.	4	2	-
2. Transition Metal Organometallics • The electron counting rules (18 electron rule, ionic model) and the basic organometallic reactions (oxidative addition, reductive elimination, insertion, de-insertion).	2	1	-
3. Introduce the basic information on the important of well known organometallic reactions and applications of organotransition metal complexes in catalysis and organic synthesis	4	2	-
4. Metal-*heteroatom* multiple bonds. Bonding and reactivity.	4	2	-
5. Homogeneous polymerisation and oligomerisation of alkenes by transition metal complexes will be discussed.	2	1	-
Midterm Exam			
6. Copolymerisation of ethylene and CO.	-	-	-
Production of polyketones.	4	2	-
7. Metathesis reactions 8. Application with cross metathesis, ROMP, RCM, ADMET are presented. Metathesis based industrial applications.	2	1	-
9. The activation of C-H and C-C bonds by transition metals	2	1	-

4– Teaching and Learning Methods

4.1- Lectures using data show and board
4.2 - Problem classes and group tutorial
4.3 – Home works, Reports and discussion groups

5- Student Assessment Methods

5.1 written examination to assess the understanding

Assessment Schedule

Assessment 1 short exam (class activities)	Every two weeks
Assessment 2 mid-term (written)	Week 8
Assessment 3 final-term (written)	Week 13

Weighting of Assessments

Mid-Term Examination	20%
Final-term Examination	60%
Semester Work	20%
Total	100%

6- List of References

Organometallic Chemistry and Catalysis by Astruc and Didier
2007, XII, 608 p. 860 illus., Hardcover

Websites on the internet that are relevant to the topics of the course:

http://en.wikipedia.org/wiki/Organometallic chemistry
www.chemweb.com
http://www.organometallicchemistry.org/

7- Facilities Required for Teaching and Learning

- Data show, screen, and laptop computer.
- White board and colored pens

Course Coordinator: Prof.Dr. Ibrahim El Tantawy El Sayed

Head of Department: Prof. Ahmed Abdel-Mageed

Date: 2/10/2010