

Programme: M. Sc. (Chemistry, Part-II)

Course Code: OCO-502

Title of the Course: Organometallic Chemistry

Number of Credits: 3

Effective from AY: 2019-20

<u>Prerequisites for the course:</u>	Should have studied the synthetic organic chemistry at M. Sc. Part-I (Chemistry) levels.	
<u>Course Objective:</u>	<ol style="list-style-type: none">1. Study of various concepts related to making carbon-carbon bonds using organometallic reagents.2. To understand the chemistry of main group chemistry towards organic synthesis.3. To understand the chemistry of transition metals towards application in organic synthesis.	
<u>Course Outcome</u>	<ol style="list-style-type: none">1. Students should be in a position to understand how organometallic chemistry can be used in making carbon-carbon bonds.2. Students should be in a position to apply various reactions in constructions of simple to complex molecules.	
<u>Content:</u>	<p>1. Introduction to organometallic chemistry:</p> <ol style="list-style-type: none">1.1 Metal-carbon bonds with main-group metals and transition metals:1.2 Sigma and pi bonds1.3 Nomenclature and hapticity1.4 Electron counting and 18e rule1.5 Orbital interactions and bonding1.6 Kinetic stability <p>2. Organometallic compounds Main group elements</p> <ol style="list-style-type: none">2.1 Preparation, properties and applications of Lithium, Magnesium, Cadmium, Zinc, Cerium, Mercury and Chromium Compounds.2.2 Heteroatom directed lithiation reactions <p>3. Transition metals in organic synthesis</p> <ol style="list-style-type: none">3.1 Preparation, properties and applications of Copper, Palladium, Nickel, Rhodium, Ruthenium and Gold reagents/complexes. (Mechanism and applications of Mizoroki-Heck, Suzuki, Stille, Hiyama, Negishi, Sonogashira, Wacker, Kumada, Buchwald-Hartwig, carbonylation, homogeneous hydrogenation, carbonylation, allylic substitution)	<p>6 hours</p> <p>12 hours</p> <p>18 hours</p>
<u>Pedagogy:</u>	Lectures & tutorials. Seminars / assignments / presentations /	

	self-study or a combination of some of these could also be used to some extent	
<u>References/Readings</u>	<ol style="list-style-type: none"> 1. <i>Comprehensive Organometallic Chemistry</i>, 14 vols. Pergman, 1995, 2nd Ed. 2. F.R. Hartley, <i>Chemistry of Metal-Carbon Bond</i>, 6 vols. Wiley 1982-83. 3. F. A. Carey and R. Sundberg, <i>Advanced Organic Chemistry</i>, Vol. B, Plenum Press, old and new editions. 4. M. Schlosser, <i>Organometallics in Synthesis - A Manual</i>, John & Wiley, 1994. 5. R.H. CraJohn, <i>The Organometallic Chemistry of the Transition Metals</i>, Wiley, 1994. 6. G.R. Stephenson, <i>Transition Metal Organometallics for Organic Synthesis</i>, Cambridge University Press, 1991. 7. L.S. Liebeskind, <i>Advances in Metal Organic Chemistry</i>, Vols. 1 and 2 (Ed.), JAI Press, 1989. 8. J. P. Colliman, L. S. Hegedus, J. R. Norton & R. G. Finke, <i>Principles and Applications of Organotransition Metal Chemistry</i>, University Science Books, 1987. 9. A. Yamamoto, <i>Organotransition Metal Chemistry - Fundamental Concepts and Applications</i>, Wiley, 1986. 10. A. J. Pearson, <i>Metallo-Organic Chemistry</i>, John Wiley, 1985. 	