Semester	JAN 2022
Open to semester	6,8,12,22
Course code	**CH3234/CH6234**
Course title	**Transition metal Chemistry**
Credits	4 /4
Course Coordinator & participating faculty (if any)	Sujit Kumar Ghosh
Nature of Course	Lectures
Pre-requisites	CHM-201: Inorganic Chemistry
Objectives (goals, type of students for whom useful, outcome etc)	The objective of this course is to provide a detailed account to the chemistry of transition metals and emphasize their relationship to other multi-disciplinary topics such as bioinorganic chemistry and organometallic chemistry. The central theme of this course is to focus on the fundamental concepts needed to understand transition metal chemistry, relevant to their structure, bonding, properties such as spectral characterizes, reactivity, stereochemistry etc. This course will be useful for all those students, who have opted for chemistry as a major subject. At the end of this course, students will also learn about the role of transition metals in several other fields like materials science, biology and catalysis.
Course contents (details of topics /sections with no. of lectures for each)	1. Nature of Metal-Ligand Bonding: Crystal and ligand field theories. Crystal field stabilization energies, Irving Williams series, 10Dq and pairing energies, Jahn-Teller Distortion, High spin and Low spin complexes. Magnetism, Molecular orbital (MO) theory of Octahedral, Tetrahedral and Square Planar complexes. Nephelauxetic Series. Pi bonding and MO Theory (10 hrs). 2. Inorganic Spectroscopy: Spectroscopic terms, LS coupling. Selection rules, Orgel diagrams, Tanabe-Sugano diagrams. Charge transfer transitions (12 Hrs) 3. Lanthanides and Actinides: Coordination chemistry, Spectra and magnetic properties. (1-2hrs) 4. Stability and Reactions of Coordination Compounds: Thermodynamic and kinetic stability, Labile and inert complexes, Ligand substitutions in octahedral and square planar complexes, Trans-Effect. Mechanism of redox reactions, Inner and outer sphere mechanisms, Photochemical

	reactions. (9 Hrs) 5. Basics of Organometallic Chemistry: The 18-electron rule, Bonding, Hapticity, Oxidation numbers and stability. Carbonyls, Nitrosyls, Alkyls, Alkylidines, Allyl and cyclic polyene complexes, Metal-metal bonds, Metallocenes, Fluxionality, Organometallic reactions, Catalysis. (6-9 Hrs) 6. Basics of Bioinorganic Chemistry: Roles of metals in biology, introduction to photosynthesis, Oxygen transport and storage by heme and nonheme proteins, Physical methods to study bioinorganic systems. (1-2hrs)
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-40% Others-20 (will be communiccated if there is any chnage)%
Suggested readings (with full list of authors, publisher, year, edn etc.)	Text Book(s) 1. Inorganic Chemistry by Huheey, Keiter, Keiter, Medhi (4th Ed.) 2. Inorganic Chemistry by Shriver & Atkins (4th Ed.) 3. Concise Inorganic Chemistry by J.D. Lee (5th Ed.)