**Course title: Bioinorganic Chemistry**

**Course code: CHM-3201**

**Course credits: 4**

**Cross listing with: NA**

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| **Learning Objectives:**  Know the various applications of metals in life related process | | |
| **Sr. No.** | **Course contents** | **No. of classes** |
| **1** | Metalloproteins and Metalloenzyme –   * Theory of occurrence and function, active-site structure, and function of metalloproteins and metalloenzymes with various transition metal ions and ligand systems * O2 binding properties of heme (haemoglobin and myoglobin) and non-heme proteins (hemocyanin & hemerythrin), their coordination geometry and electronic structure, co-operativity effect, binding of CO to Myoglobin, Hemoglobin, and their model compounds * Representative synthetic models of heme and non-heme systems * Iron–Sulfur Clusters, Iron-Protein structure | 12 (18 hrs) |
| **2** | Electron transfer proteins   * Active site structure and functions of ferredoxin, rubredoxin and cytochromes, and their comparisons. * Vitamin B12 and cytochrome P450 and their mechanisms of action, Model compounds | 4 (6 hrs) |
| **3** | Metals in medicine (MIM)   * Therapeutic applications of cis-platin, transition metal radioisotopes (example: Tc, Co and Cu etc.) and MRI (Mn and Fe) agents. * Superoxide Dismutase Mimics, Vanadium-Based Diabetes, Copper Toxicity (Disease States, and Treatments, Familial Amyotrophic Lateral Sclerosis (FALS), Wilson and Menkes Diseases) * Diagnostic agents (Gadolinium MRI Imaging Agents, Magnetic Imaging Considerations, Kinetics, and Thermodynamics of Complexes) * Drugs Toxicity of metals - Cd, Hg and Cr toxic effects with specific examples. | 8 (12 hrs) |
| **References:**  Textbooks:  1. J. E. Huheey, E. A. Keiter, R.L. Keiter and O. K. Mehdi, Inorganic Chemistry, Principles of Structure and Reactivity, 4th Edition, Pearson, 2006.  2. C. E. Housecroft and A. G. Sharpe, Inorganic Chemistry, 4th Edition, Pearson, 2012.  3. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, University Science Books, 1994. | | |
| **Learning outcomes:**  Bioinorganic Chemistry is an interdisciplinary subject and has grown interest in Chemistry, Biology, and medicine. This course will teach you various applications of metals in nature and in our daily life.  **Students will be able to**   * Explain natural enzymes mechanism in biological system. * Utilize the principles of coordination complexes in understanding functions of biological systems. | | |
| **Grading rubrics:**  Quiz 30%  Assignment 40%  Exam 30% | | |