



# METALS IN BIOLOGY

**PROF. D. MAITI**

Department of Chemistry  
IIT Bombay

**TYPE OF COURSE** : Rerun | Core | UG | PG

**COURSE DURATION** : 8 weeks (26 Jul'21 - 17 Sep'21)

**EXAM DATE** : 26 Sep 2021

**INTENDED AUDIENCE** : Chemistry, Biochemistry students/faculty

**COURSE OUTLINE :**

Metals are the vital component of any biosystem. Starting from transporting biochemicals to catalyzing biochemical transformations, almost every process requires presence of a metal center. In order to understand these processes, knowledge of specific functions carried out by these metals are necessary. This course will be helpful to understand the fundamental properties of the metals present in biosystems and mechanism of their action.

**ABOUT INSTRUCTOR :**

I am Dr. Debabrata Maiti, Associate Professor at IIT Bombay. I have completed PhD from Johns Hopkins University with Prof. Kenneth D. Karlin in bioinorganic chemistry. Then I moved to MIT where I did my Post-doctoral research with Prof. Steven Buchwald. I have started independent carrier at IIT Bombay in 2011 and since then involved actively in teaching bio-inorganic chemistry and organometallic chemistry. Our group is also active in research areas of bio-inorganic chemistry and C-H activation.

**COURSE PLAN :**

**Week 1** : Introduction Lecture; Distribution of Metals in Biology; Metal storage in body

**Week 2** : Regulation of metal ion concentration; Hydrolytic enzymes-Carbonic anhydrase & carbopeptidase Hydrolytic enzymes-Araginase and urease

**Week 3** : Oxygen transport proteins, Dioxygen reactivity in copper, Copper-oxygen chemistry

**Week 4** : Copper-oxygen chemistry and its mechanism, Iron catalyzed oxidation, Nitrous oxide reductase

**Week 5** : Cytochrome C oxidase, Mononuclear nonheme iron (NHI) enzymes, alpha-Keto Glutarate dependent Halogenase, Cytochrome P450-Introduction

**Week 6** : Cytochrome P450-Part II-Reactions, Cytochrome P450-Part III- Mechanism & Role of Cysteine ligand, Methane monooxygenase

**Week 7** : Photosynthesis, Photosynthesis & pumps - channels, Protein involved in O<sub>2</sub> transport

**Week 8** : Dioxygen reactivity in copper, Dioxygen reactivity in iron