



METALS IN BIOLOGY

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IIT Bombay

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 :

Prof. Debabrata Maiti is an Associate Professor at IIT Bombay. He completed PhD from Johns Hopkins University with Prof. Kenneth D. Karlin in bioinorganic chemistry. Then he 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 :

Lecture 1: Introduction

Lecture 2,3: Distribution of metals in biology

Lecture 4,5: Metal storage in body

Week 2 :

Lecture 6,7: Regulation of metal ion concentrations

Lecture 8,9 : Hydrolytic enzymes-Carbonic anhydrase & carbopeptidase

Lecture 10: Hydrolytic enzymes-Araginase and urease

Week 3 :

Lecture 11: Oxygen transport proteins

Lecture 12,13,14: Dioxygen reactivity in copper

Lecture 15: Copper-oxygen chemistry

Week 4 :

Lecture 16: Copper-oxygen chemistry and its mechanism

Lecture 17,18: Iron catalyzed oxidation

Lecture 19,20: Nitrous oxide reductase

Week 5 :

Lecture 21,22: Cytochrome C oxidase

Lecture 23: Mononuclear nonheme iron (NHI) enzymes

Lecture 24: alpha-Keto Glutarate dependent Halogenase

Lecture 25: Cytochrome P450-Introduction

Week 6 :

Lecture 26: Cytochrome P450-Part II-Reactions

Lecture 27,28: Cytochrome P450-Part III- Mechanism & Role of Cysteine ligand

Lecture 29,30: Methane monooxygenase

Week 7 :

Lecture 31,32: Photosynthesis

Lecture 33,34: Photosynthesis & pumps - channels

Lecture 35: Protein involved in O₂ transport

Week 8 :

Lecture 36: Dioxygen reactivity in copper

Lecture 37,38: Dioxygen reactivity in iron