

In.M.Sc, Applied Chemistry (5 years)

10th Semester

FCYC 1001	Bioinorganic & Supramolecular Chemistry	3-0-0	3 Credits
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Module I

[12 Lectures]

Metal ions in biological systems and its storage transport and biomineralization: Essential and trace elements, Ferritin, transferrin, and siderophores.

Calcium in Biology: Transported regulation, Intracellular Ca^{2+} transport, Ca^{2+} ATpase, $\text{Na}^{+}/\text{Ca}^{2+}$ exchange, mitochondrial influx and efflux. Inositol triphosphate, Ca^{2+} regulated intracellular processes: Calmodulin, Troponin C.

Metalloenzymes: Zinc enzymes: Carboxypeptidase and carbonic anhydrase; Iron enzymes: catalase peroxidase and cytochromes, Cyt-P450; Copper enzymes: Superoxide dismutase; Molybdenum oxatransferase enzymes: xanthine oxidase. Coenzyme vitamin B₁₂. sulphur proteins

Module II

[6 Lectures]

Nitrogen fixation: Biological nitrogen fixation, molybdenum nitrogenase, spectroscopic and other evidence, other nitrogenases model systems.

Photosynthesis: Chlorophylls, photo system I and photo system II in cleavage of water.

Transport and storage of dioxygen: Heme proteins and oxygen uptake, structure and function of hemocyanin and hemerythrin, model synthetic complexes of iron, cobalt and copper.

Module III

[12 Lectures]

Supramolecular Chemistry.

Introduction-the meaning of supramolecular chemistry, phenomenon of molecular recognition and their quantification

Building blocks of supramolecular chemistry- acyclic receptors for neutral and charged guests, macrocycles and crown ethers, macrobicycles and cryptands, macropolycycles, cucurbiturils and cyclodextrins

Essential Readings:

1. Principles of Bioinorganic Chemistry, S .J. Lippard and J. M. Berg., University Science Books. 1994
2. Bioinorganic Chemistry, I. Bertini, H. B. Gray, S. J. Lippard and J. S. Valentin, University Science Books.
3. Progress in Inorganic Chemistry, Vols 18 and 38 ed, by J. J. Lippard, Wiley.
4. Bioinorganic Chemistry, Asim K. Das, Books and Allied, 2nd Edn., 2007.
5. Supramolecular Chemistry, J. W. Steed and J. L. Atwood, Willey, 2nd Ed., 2009.
6. Bioinorganic and Supramolecular Chemistry, P. S. Kalsi, J. P. Kalsi, New Age

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International, 2nd Edn., 2012.

7. An Introduction of Supramolecular Chemistry, Asim K. Das, Books and Allied, 1st Edn., 2017.
8. Supramolecular Chemistry: Concepts and Perspectives, J.M. Lehn, VCH, Weinheim, 1995
9. Principles and Methods in Supramolecular Chemistry, H. J. Schneider and A. Yatsimirsky, Wiley, New York, 2000.
10. Supramolecular Chemistry - Fundamentals and Applications, Ariga, Katsuhiko & Kunitake, Toyoki, Iwanami Shoten Publishers, Tokyo, 2006,