



# NMR SPECTROSCOPY FOR STRUCTURAL BIOLOGY

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**PRE-REQUISITES:** Under graduate level understanding of Physics and Mathematics, Basic course on NMR spectroscopy

**INTENDED AUDIENCE:** M.Sc./ PhD students & Scientist, and Scientists working in Biopharma Industries.

**INDUSTRY SUPPORT:** Biocon, Sunpharma, Alembic, Bharat Biotech, Aurobindo Biopharma etc.

## **ABOUT THE COURSE:**

This course will start with Basic principles of NMR, Discuss practical aspects of NMR spectroscopy, peptide NMR, Protein NMR, Nucleic acids NMR. We will teach with examples how to solve structure and measure dynamics using NMR.

## **ABOUT THE INSTRUCTOR:**

Prof. Kumar is an Associate Professor in the Department of Biosciences and Bioengineering. His area of research is NMR based structural biology. Prof. Kumar develop and apply NMR methods to understand protein structure and dynamics.

Prof. Hosur is Distinguished Visiting Professor in the Department of Biosciences and Bioengineering, IIT Bombay. Prior to this, he was senior Professor in Tata Institute of Fundamental Research, Mumbai

## **COURSE PLAN:**

**week 1:** Basics Principles of NMR; Nuclear Spin in static magnetic field

**Week 2:** Basics Principles continued; Chemical Shift; Factors Influencing Isotropic Chemical shifts

**Week 3:** NMR instrumentation and Peptide sample preparation; Overview of NMR instrument Magnet, transmitters etc

**Week 4:** Two-dimensional NMR And Practical Aspects for experiment; Two- dimensional correlation experiments COSY

**Week 5:** Peptide and Protein structure Structural features and parameters; Structural features and parameters

**Week 6:** Sample preparation for Protein NMR; Expression systems, Optimization of protein expression

**Week 7:** Multi-dimensional Heteronuclear NMR experiments; 2D Heteronuclear NMR experiments

**Week 8:** Multi-dimensional Heteronuclear NMR experiments; Experiments for Backbone assignment

**Week 9:** Protein Structure determination from NMR data; Structure calculation methods and NMR parameters

**Week 10:** Protein dynamics from NMR data; Theory of spin relaxation in proteins

**Week 11:** Nucleic acids NMR experiments; Structural features and parameters for Nuclei acids

**Week 12:** DNA and structure determination from NMR data