

UGC-Human Resource Development Centre (Academic Staff College)
Jamia Millia Islamia, New Delhi-110025
5th three week Refresher Course in Basic Sciences (Interdisciplinary)
(May 05 to May 25, 2014)

World is profoundly shaped by science and technology. All the societies in the world have ways to educate their young members to ensure that they become full participants in society and are able to contribute and develop an appropriate scientific and technological culture. In the view of above, theme of the 5th refresher course (RC) in Basic Sciences is aimed to emphasize on the emerging trends in basic sciences and their impact on physical and life sciences. This refresher course intends to be of interest and utility to teachers and researchers in the academic, industrial and government sectors. Most profound beneficiary of the approaches in the field of research and development had always been the discipline of life sciences and their allied areas including the huge horizon of medical sciences. Hence, it is mankind who evidently remained maximally benefited so far. Similar promising results are expected by the community of scientists of all disciplines by adopting the interdisciplinary approaches. Keeping the track on glorious history of interdisciplinary basic sciences and in view of the tremendous requirement of the same in future, the design of this RC has been proposed as a small step of the long journey for training young faculties, scientists and researchers.

Three weeks would be devoted to cover numerous interdisciplinary topics. Maximum efforts will primarily be done to raise the contemporary and challenging scientific issues. However, fundamentals of knowledge relevant to interdisciplinary topics would also be dealt in, as or when needed with focus on application of the knowledge. With these backgrounds, the proposed RC is expected to accommodate following broader areas of interdisciplinary in nature.

1. Biophysical Chemistry: Quantitative analysis of the properties of biological macromolecules, biologically active molecules, macromolecular assemblies and cell components in terms of kinetics, thermodynamics, spatio-temporal organization, NMR and X-ray structural biology, as well as single-molecule detection. Theoretical and computational treatments of bio-macromolecular systems, macromolecular interactions, regulatory control and systems biology are

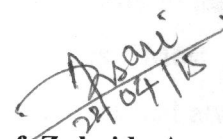
also of interest to the course. Knowledge related to applications of basics of chemistry will be utilized through appropriate lecture titles by invited speakers.

2. **Biophysics and Structural Biology:** Applying the physical concepts to understand the functioning or disorder in the biological system are important to address unanswered questions to be addressed. Some examples are, are the conserved (or semi-conserved) residues of a protein essential in its thermodynamic stability and mechanism of folding? What are the optical and hydrodynamic characteristics of protein folding intermediates?
3. **Nanotechnology:** Nanotechnology itself is interdisciplinary in nature. It is based on quantum mechanical principles applied to understand the phenomena and functions taking place at the nanometer scale. Resource persons will address the recent advances associated, major hurdles/limitations, and future prospective of the nanotechnology cutting-edge research providing distinctive views about the future of nanoscience and nanotechnology.
4. **Medicinal Chemistry:** An integral part of the research involves the development and application of modern techniques of bioorganic chemistry for the synthesis, separation, spectral and biological investigation of new chemical agents including bioactive natural products. These compounds screen for different biological activity like antimicrobial and anticancer.
5. **Systems Biology and Bioinformatics:** Simulation techniques to understand natural cycles, cell-cell communication using computational and mathematical modelling. Applicability of bioinformatics tools for unravelling the structure and functions of proteins and nucleic acids. Utilization of bioinformatics for adopting focussed experimental approaches.
6. **Biostatistics:** Proper analysis and interpretation of scientific data generated in the biology e.g. public health analysis in the biomedical sciences. Biostatisticians regularly engage in interdisciplinary collaborations and advance their discipline through pursuit of methodological development of statistical methods for biomedical applications. Therefore, introductory biostatistics with fundamental statistical approach is proposed to refresh the memories of young participants.

7. Microbiology: In order to help the participants from departments of medical, dental, physiotherapy, and related institutions, topics relevant to microbiology, immunology, molecular biology, virology etc. will be undertaken with particular emphasis over generalized understanding of pathogens, diagnostics and therapeutics.
8. Some topics on the basics of physics, math and chemistry have been planned for refreshing the knowledge of participants from the biology background.



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