

# UNDERGRADUATE PROGRAMME IN BIOCHEMISTRY

## Paper No- 14 Techniques for Cellular and Molecular Biology Research

### THEORY

Several cellular and molecular techniques that are relevant for project work as well as for the development of a trained biochemist will be taught in this paper. Techniques to be taught will include those related to, but not limited to, imaging, proteomics, transcriptomics and genomics platforms such as FACS analysis and sorting, fluorescence and confocal microscopy, immunological techniques, mass spectrometry, real time PCR and microarray, next generation DNA sequencing techniques, whole genome sequencing and others. After teaching the fundamentals of various techniques, their applications would be taught/discussed using case studies.

### PRACTICAL

The practicals will involve use of several instruments, analysis and interpretation of data.

### Suggested Readings:

1. Genomes (2002) 2<sup>nd</sup> ed., Brown, T.A., Oxford: Wiley-Liss (Manchester, UK), ISBN: 0-471-25046-5.
2. Microarray Technology and its Applications (2005) Muller, U.R. and Nicolau, D.V. (eds), Springer (Berlin), ISBN: 978-3-540-22931-5.
3. The Ultimate Guide to Your Microscope (2008) Levine, S. and Johnstone, L., Sterling, ISBN: 978-1-4027-4329-0.
4. Physical Biochemistry: Principles and Applications (2010) 2<sup>nd</sup> ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
5. Introduction to Proteomics: Principles and Applications (2010) 1<sup>st</sup> ed., Mishra, N.C., John Wiley and Sons (New Jersey), ISBN: 978-0-471-75402-2.
6. Principles and Techniques of Biochemistry and Molecular Biology (2010) 7<sup>th</sup> ed., Wilson, K., and Walker, J. (eds), Cambridge University Press (New Delhi), ISBN: 978-0-521-73167-6 / ISBN: 978-0-521-51635-8.
7. Introduction to Instrumentation in Life Sciences (2012) Bisen, P.S. and Sharma, A., CRC Press/Taylor and Francis Group (California), ISBN: 978-1-4665-1240-5.
8. Molecular Cloning: A Laboratory Manual (2012) Vol. 1-3, 4<sup>th</sup> ed., Green M.R. and Sambrook J., Cold Spring Harbour Laboratory Press (New York). ISBN: 978-1-936113-41-5 / ISBN: 978-1-936113-42-2.
9. Biophysical Chemistry (2013), Schimmel, C.R.C., Macmillan Higher Education, ISBN : 0716738619, 9780716738619.
10. Current Protocols in Cell Biology (2013) Bonifacino, J.S., Dasso, M., Harford, J.B., Lippincott-Schwartz, J. and Yamada, K.M., John Wiley and Sons (Somerset, NJ), ISBN: 1934-2500.
11. Current Protocols in Protein Science (2013) Coligan, J.E., Dunn, B.M., Speicher, D.W., Wingfield, P.T., Lippincott-Schwartz, J. and Yamada, K.M., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3655 / Online ISSN: 1934-3663.

12. Current Protocols in Molecular Biology (2013) Ausubel, F.M. et al., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3639 / Online ISSN: 1934-3663.
13. Current Protocols in Immunology (2013) Coligan, J.E. et al., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3671 / Online ISSN: 1934-368X.