SYLLABUS FOR
Ph.D. DEGREE PROGRAMME

BMB 701 RESEARCH METHODOLOGY 3 CREDITS

UNIT – I ANALYTICAL METHODS

Principle and techniques of UV-VIS spectrophotometry. Beer- Lambert's law – quantitative methods of analysis coupled – assays – Kinetics – Protein estimation methods. Spectrofluorimetry – Flame – Atomic absorption spectrophotometry. — 3 Lectures

Microscopy basic principle and applications – Light – Compound – Scanning Electron Microscopy (SEM) - Transmission Electron Microscopy (TEM) – Scanning Tunneling Microscopy (STM) – Fluorescence Microscopy – Confocal Microscopy. — 4 Lectures

Principles – Techniques and Applications of Electron Spin Resonance – Nuclear Magnetic resonance - Circular Dichroism (CD) – Optical Rotatory Dispersion (ORD) — 3 Lectures

UNIT – II PROTEIN PURIFICATION METHODS & PROTEOMICS

3 Lectures

Introduction – Purification methods – Centrifugation – basic principles – Centrifugation units – types of centrifuges – centrifugation methods – sedimentation velocity - sedimentation equilibrium – cell fractionation methods.

5 Lectures

Chromatography – types – thin layer, paper, adsorption, partition, ion–exchange, affinity, Gas–liquid, - HPLC principles – instrumentation and accessories – detection methods, qualitative & quantitative aspects – applications.

4 Lectures

Protein electrophoresis – pulsed field – capillary – isoelectric focusing – blotting methods – application methods in Life Sciences & Biotechnology.

5 Lectures

UNIT – III GENOMICS

Introduction to Genomics – DNA/RNA isolation methods - Nucleic acid hybridization techniques – southern – dot blot analysis – Nucleus run on – DNA foot printing - amplification techniques – polymerase chain reaction - RT-PCR, Real Time RT – PCR techniques – DNA micro array.

UNIT IV – BIOSTATISTICS

Introduction – definition of statistics – population and universe – sample and population.	2 Lectures
Correlation regression and line fitting through graph points – standard curves – correlation – Linear regression analysis – fitting the best straight line through series of points.	3 Lectures
Handling of bulky data – construction a histogram - interpretation of histogram – the normal distribution - poisson distribution – the mean-mode-standard deviation-standard error.	3 Lectures
Proportion data – Examples of proportion data – Statistical treatment to proportion data – MPM – LD_{50} - ED_{50} - PD_{50} ANOVA –t-test.	3 Lectures

Suggested Reading

1. Freifelder D.M. Physical Biochemistry – Application to Biochemistry and Molecular Biology, 1982.
2. Wilson & Walker. Principles and Techniques in Practical Biochemistry. 5th ed. Cambridge Univ. Press, 2000.
3. West & Todd Biochemistry. 4th ed. Oxford and IBH.
4. Honst Friebolin. Basic One and Two – dimensional spectroscopy. VCH Publ.1991.
5. Murphy D.B. Fundamental of Light Microscopy & Electron Imaging. 1th ed. Wiley-Liss, 2000.
6. Pierre Crabbe. ORD and CD in Chemistry and Biochemsitry: An Introduction. Academic Press, 1972.
7. Paddock S.W. Confocal Microscopy methods & protocols. 1st ed. Human Press, 11999.
8. Green.R.H. Sampling Design and Statistical Methods for Environmental Biologists John Wiley & Sons, 1979.
9. Snedecor G.W & Cochran W.G. Statistical methods 8 th ed. Iowa State Press, 1989.
10. Thomas Glover *et al.* Introduction to Biostatistics 1 st ed. McGraw – Hill Science, 2001.