



UNIVERSITY OF CALICUT

Department of Life Sciences

Syllabus for Ph.D. in Biochemistry, 2013-2018

Name of the candidate: Liji.P

PAPER I: BCHPHDC01: RESEARCH METHODOLOGY

1. Science and its characteristics: Testability, Repeatability, falsifiability, hypotheses; theories and laws in science; Ad hoc- hypothesis, axillary hypothesis, observation, evidence and proofs.
2. Design of an experiment; sample, procedure of sampling, sample size, experimentation, observation, data collection, interpretation and deduction. Planning of experiments, Experiment Design, selection of controls, observational requirements, instrumental requirements, documentation of experiments.
3. Nature and types of data typical examples. Data acquisition, treatment of data, data interpretation, Significance of statistical tools in data interpretation, errors and inaccuracies. Data presentation: graphs, tables, histograms and pi diagrams. Statistical testing of hypothesis. Biased observations, influence of observations, using and acknowledging observations by others. Use of computer packages in storing, analysing and managing data.
4. Writing a research report, scientific writing, format for scientific reporting, tables, text, foot notes, illustrations, and paginations, references, index, Applications of computer packages in bibliographic management, Preparation of a research project: Formulating research idea, defining problems and literature search, finalizing the outline of writing.
5. Biochemical techniques and instrumentation: Details of all modern biochemical separation techniques based on size, shape, molecular weight, polarity, charge, affinity(principle, methods, instrumentation and applications), use of MS, ES-MS, LC-MS, MALDI-TOF techniques in modern biochemical research. Quantitative analytical methods based on absorption, emission and fluorescence. Use of Polari meter in biochemistry. Techniques used in macromolecular conformational studies: NMR, X-ray crystallography, AFM, circular dichroism in secondary structure studies of proteins, surface Plasmon resonance techniques in DNA studies. Immunochemical techniques and blotting techniques.

References

1. Essentials of research design and methodology, Geoffrey Marczyk, David Dematteo, David Festinger, 2005.
2. Research methodology in the medical and biological sciences, Petter Laake, Haakon Breien Benestav and Bjorn Reino Olsen, 2007.
3. Research methodology, Dipak Kumar Bhattacharyya, second edition, 2006.
4. Researching information system and computing, Briony J Oates, 2006.
5. Research methodology-methods and techniques, C.R.Kothari, second edition, 2004.
6. Methods of biochemical analysis, Bioanalytical instrumentation, edited by Clarence H Suelter, Vol:37, 1994.
7. Modern physical methods in biochemistry, A Neuberger and L.L.M.Van Deenen, Elsevier, Vol:11A, 1985.
8. A complete introduction to modern NMR spectroscopy, Roger S.Macomber, 1998.
9. Recent developments in mass spectrometry in biochemistry and medicine, edited by; Alberto Frigerio, volume 2, 1979.
10. Current trends in X-ray crystallography, edited by; Annamalai chandrasekharan, 2011.
11. Advanced protein methods and techniques in biochemistry, Charlie fennel, first edition, 2012.
12. Analytical biochemistry, David J Holme, Hazel peck, Third edition, 1998.
13. Advanced X-ray crystallography, editor; Kari Rissanen, 2012.
14. Handbook of surface plasmon resonance, edited by; Richard B M Schasfoort and Anna J Tudos, 2008.
15. LC-MS/MS in proteomics-Methods and applications, edited by; Pedro R.Cutillus, John F.Timms, 2010.
16. Principles of physical biochemistry, Kensal E.Van Holde, W.Curtis Johnson, P.Shing Ho, Second edition, 2006.
17. Separation techniques in chemistry and biochemistry, Keller, Roy.A, 2002.

MODEL QUESTION PAPER
PAPER I: BCHPHDC01: RESEARCH METHODOLOGY

Duration: 3 hr
Max.marks: 70

Part A (8×5)

1. Science and its characteristics.
2. Explain planning and design of an experiment.
3. Format for scientific writing of research report.
4. X-ray crystallography.
5. Surface plasmon resonance techniques in DNA studies.
6. Data collection methods.
7. Mass spectroscopy.
8. Statistical testing of hypothesis.
9. Use of LC-MS technique in modern biochemical research.
10. Nuclear magnetic resonance spectroscopy.

Part B (3×10)

1. Use of computer packages in storing, analyzing and managing data.
2. Use of MS, ESMS, LC-MS, MALDI-TOF techniques in modern biochemical research.
3. Explain preparation of a research project.
4. Immunochemical techniques and blotting techniques.