Centre for Biochemistry and Microbial Sciences

School of Basic and Applied Sciences
Central University of Punjab, Bathinda

Ph.D. Program in Biochemistry

2017-18

Semester I

Ph.D. Program in Biochemistry

Sr. No	Course Code	Course Title	L	P	Cr
1	LBM.701	Research Methodology and Computer Applications	4	-	4
2	LBC.702	Advanced Biochemistry	4	-	4
		Total Sem-1			**8**

L: Lectures; P: Practical; Cr: Credits

In addition to the course work, 80 research credits are required for the award of PhD degree.

Semester I

LBM.701: Research Methodology and Computer Applications

Part	Syllabus	Lectures
1.	**General Principles of Research:** Meaning and importance of research, Critical thinking, Formulating hypothesis and development of research plan, Review of literature, Interpretation of results and discussion. **Technical Writing:** Scientific writing, Writing synopsis, Research paper, Poster preparation, oral presentations and Dissertations.	18
2.	**Introduction and Principles of Good Lab Practices:** Good laboratory practices, Biosafety for human health and environment. Biosafety issues for using cloned genes in medicine, agriculture, industry, and eco-protection, Biological containment and physical containment, CDC Biosafety levels, Biosafety in Clinical laboratories and biohazard management, Physical, Chemical & Biological hazards. **Research ethics:** Ethical theories, Ethical considerations during research, data manipulations, subject consent, Animal testing. Animal rights, Perspectives and methodology & Ethical issues of the human genome project, Plagiarism	18
3.	**Computer Application Software:** Spreadsheet applications, Word-processing applications, Presentation applications, Internet browsers, Reference Management, and Image processing applications. World wide web: Origin and concepts, Overview of internet and its application for quality literature collection and secondary data related to research work. Exploring various websites and search engines. Computer application to some statistical packages (Graphpad prism, SPSS etc). *In silico* approaches for drug designing.	18
4.	**Bioinformatics:** Organization, management and analysis of biological data, use of computers in data analysis, biological databases - DNA sequence databases and protein sequence databases, BLAST, FASTA, multiple sequence alignment, primers in biology (design and types of primers) genome projects (human, *Arabidopsis* and other genome projects), NCBI, UCSC and other database searches.	18

Suggested Reading:

1. Gupta, S. (2008). *Research Methodology and statistical techniques*. Deep & Deep Publications (P) Limited, New Delhi.
2. Kothari, C. R. (2014). *Research methodology (s).* New Age International (p) Limited. New Delhi.
3. Sahay, Vinaya and Pradumna Singh (2009). *Encyclopedia of Research Methodology in life sciences.* Anmol Publications. New Delhi.
4. Kauda J. (2012). *Research Methodology: A Project Guide for University Students*. Samfunds literature Publications.
5. Dharmapalan B. (2012). *Scientific Research Methodology*. Narosa Publishing
6. Norman, G. and Streiner, D. (2008). *Biostatistics:* The Bare Essentials.3/e (with SPSS). Decker Inc. USA.
7. Rao, P. P., S. Sundar and Richard, J. (2009). *Introduction to Biostatistics and Research Methods.* PHI learning.
8. Christensen, L. (2007). *Experimental Methodology*. Boston: Allyn & Bacon.

9. Fleming, D. O. and Hunt, D.L. (2006). *Biological Safety: Principles and Practices*. American Society for Microbiology, USA.
10. Rockman, H. B. (2004). *Intellectual Property Law for Engineers and Scientists*. Wiley-IEEE Press, USA.
11. Shannon, T. A. (2009). *An Introduction to Bioethics*. Paulist Press, USA.
12. Vaughn, L. (2009). *Bioethics: Principles, Issues, and Cases.* Oxford University Press, UK.

LBC.702: Advanced Biochemistry

Part	Syllabus		Lectures
1.	**Metabolism:** Recent advances in amino acid, carbohydrate, lipid and nucleotide metabolism.		18
2.	**Xenobiotic Metabolism:** Chemical nature of xenobiotic; Transport of xenobiotic within the body; Fate of metabolism; Biotransformation; Detoxification; Examples of xenobiotic metabolism.		18
3.	**Stress Biology:** The stress response; Biomarkers of chronic stress and their role in diagnosis and therapy; Metabolic and neuroendocrine biomarkers; Exocytosis and ER Stress: Role of disruptive function of glycosylation/inter- and intra-molecular disulfide bond formation.		18
4.	**Advanced Techniques and Their Applications:** Metabolomics, Proteomics, protein-protein interactions, protein-metabolite interactions; Applications in Agriculture and Human Health		18
	Suggested Reading: Research papers and reviews published in peer-reviewed international journals in the above areas.		