

Syllabus for Ph. D course work in Biochemistry 2018

Paper I- Research Methodology (4 credits)

Objectives and types of research: Motivation and objectives – Research methods vs Methodology. Types of research- Descriptive vs Analytical, Applied vs Qualitative, Conceptual vs Empirical.

Design of Experiments: Objectives, strategies, Factorial experimental design, Designing biological laboratory experiments, basic principles-replication, randomization, blocking, Guidelines for design of experiments.

Factor analysis, Single factor, two-factor factorial experiments under fixed, mixed and random effects model. Analysis of data under these models using statistical softwares like SPSS/ SAS.

Statistical Data Analysis: Statistical analysis and reporting the conclusions based upon the experimental data

Probability theory, conditional probability, Probability distribution, Binomial, Poisson and Normal distributions.

Confidence intervals for mean and variance, Response surface methodology.

Statistical hypothesis testing using t-test, F-test, Chi-square test, Goodness of fit test, p-value and its significance,

Correlation and regression analysis, Simple and multiple regression, logistic regression. Analysis of Variance,

An Insight into Research : Definition and basic concepts, objectives, significance and types and characteristics of research

Ethical, legal, social and scientific issues in research

Definition and kinds of scientific documents – research paper, review paper, book reviews, theses, conference and project reports (for the scientific community and for funding agencies). Finding research materials – literature survey, compiling records.

Components of a research paper– the IMRAD system, title, authors and addresses, abstract, acknowledgements, references, tables and illustrations.

Dealing with publishers – submission of manuscript, ordering reprints.

Oral and poster presentation of research papers in conferences/symposia. Preparation and submission of research project proposals to funding agencies

Impact Factor, Citation index, h-index, i-index.

Role of IPR in research and development.

Basics of Bioinformatics, Biological Database: Nucleic acid Sequence, Protein Sequence, Protein structure and Genome database. Bioinformatics Tools and software: BLAST, ClustalW, Rasmol and ExPasy tools.

Paper II – Advanced Course Biochemistry (3 credits)

Homogenization and isolation methods.

Chromatographic separation techniques. Ion exchange chromatography, Molecular sieve chromatography, Affinity chromatography, HPLC.

Polyacrylamide and Agarose Gel Electrophoresis. Isoelectric focusing

Spectroscopic analyses. UV-VIS Spectrophotometry, Spectrofluorometry, AAS, NMR

Blotting techniques Southern, Northern, Western, RAPD, RFLP, DNA foot printing and modification interference assay, Site directed mutagenesis, PCR- Basics and types.

Immunotechniques. Immunoelectrophoresis, Immunodiffusion, RIA, ELISA

Research plan for animal and plant experimentation.

Paper III - Computer Applications (3 credits)

Storage devices and memory. System and Application Software, Compilers, Interpreters and Assemblers. Computer Languages: Levels of languages, Generations of Computer, Evolution of IT, Applications of Computer,

MS WORD: Features and applications related to presentation of text in suitable format and saving the data for future applications. Practical knowledge of MS Word to type the script, insert tables, figures and graphs to prepare thesis and research papers in presentable format. Word Processing and its use in Research; formatting tools, header footer, references, Mail Merge etc.

MS EXCEL: Construction of spreadsheets from the experimental data. Design and application of formulae for calculations and their applications to the experimental data. Use of statistical tools, preparation of graphs, histograms, charts and diagrams.

MS POWER POINT: Preparation of power point presentations based on the topic of research. Insertion of figures, graphs, charts in presentation. Preparation of scientific posters for presentations. Use of various presentation techniques. Data Presentation for various audience; Classification, Codification and Arrangement of Data, Data presentation in tables, charts, graphs, etc. Use of Excel for Data Analysis.

USE OF SPSS & INTERNET APPLICATIONS: Method of preparing data sheets and entering the data according to its characteristics. Internet Search and applications in research, Exploring various websites and search engines for collecting quality literature and secondary data related to research work.

Paper IV - Review of Literature (3 credits)

Student's skill will be evaluated by data collection, compilation and presentation from books/Journals. They will refer periodicals/ scientific databases (ex. Pubmed/ Protein /Genomics databases etc) or books. Student will be asked to submit the review and present in front of faculty.

Comprehensive viva voce (3 credits)