

# **Structure and Details of PhD coursework Syllabus**

**Department of Life Sciences**

**Presidency University**



**PRESIDENCY UNIVERSITY**  
**KOLKATA**



**Department of Life Sciences**

**(Faculty of Natural and Mathematical Sciences)**

**Presidency University**

**Hindoo College (1817-1855), Presidency College (1855-2010)**

**86/1, College Street, Kolkata - 700 073**

**West Bengal, India**

## Course Structure

	<b>Name of Paper</b>	<b>Full Marks</b>	<b>Credits</b>
Paper-1	Research Methodology and Allied Computer Applications	50 marks	4
Paper-2	Critical Analysis of Scientific Literature	50 marks	4
Paper-3	Care and Use of Common Laboratory Equipment/ Facilities	50 marks	4
Paper-4	Writing and Presentation Skills	50 marks	4

## Detailed Syllabus

### **Paper-1: Research Methodology and Allied Computer Applications (Non-sessional Paper, 50 marks, 4 credits)**

#### ***A: Research Bioethics and Good Laboratory Practice***

- (a) Introduction, Overview, and Research Misconduct, rules and regulations in India.
- (b) Data Management
- (c) Mentoring, mentor-mentee responsibilities
- (d) Authorship Guidelines, Publication and Peer Review
- (e) Intellectual property, plagiarism, patents
- (f) Collaboration
- (g) Reporting and representing research, representing images.
- (h) Bias, Conflicts of Interest
- (i) Ethical use of animal subjects
- (j) Protection of Human subjects
- (k) Stem Cell Ethics
- (l) The Ethics of Plant Use, transgenic crops
- (m) Agricultural Ethics
- (n) Ecosourcing-code of practice
- (o) Radioactive, chemical and biohazard safety, waste management and disposal
- (p) Social Responsibility and Whistleblowing

**B: Statistical Methods:**

Numerical and graphical presentation of data; Measures of central tendency; Measures of dispersion; Testing of significance of hypothesis by student's t-test, paired t-test and Fisher's t-test; Determination of correlation coefficient between two variables; Regression analysis; Theories of probability; Analysis of variance; Post-hoc test; Statistical distributions (Normal, binomial and Poisson distributions); Basic statistical modelling.

**C: Basics of Bioinformatics:**

Introduction to Bioinformatics; Bioinformatics data types; Sequence formats (e.g. raw text, FASTA, Stockholm); Databases; Introduction to major databases in Bioinformatics; Sequence alignments; Basic Bioinformatics tools (BLAST, CLUSTALW); Molecular visualization using Rasmol.

**D: Computer Applications and Referencing tools:**

Use of statistical software, regression analysis of bivariate data), data presentation and handling in Excel and image processing and calculations using Image J. Use of reference managers; online searches (may be conducted by the library upon request).

**Paper-II: Critical Analysis of Scientific Literature (Non-Sessional Paper, 50 marks, 4 credits)**

Students will be exposed to critical reading of research articles where group discussions will be held on at least three journal articles related to the general field of research. Each group will consist of at least three students and three faculty members with similar research interests.

A formal written examination will be taken based on critical analysis of the discussed research articles. Internal assessment will be based on presentation of a paper in the Departmental seminar series.

**Paper III: Care and Use of Common Laboratory Equipment/ Facilities (Sessional Paper, 50 marks, 4 credits)**

This will be a sessional paper based continuous evaluation. It will be conducted by the facility/instrument in charge. This will include a theoretical background followed by hands-on training. The following instruments/ facilities may be covered.

- A. Centrifuges
- B. Microscopes
- C. Histomorphometry
- D. Flow cytometry
- E. Animal and Plant cell culture
- F. Animal handling and Aquaculture
- G. Gel Doc/ Chemidoc
- H. Real time PCR

- I. Spectroscopy including Nanodrop
- J. Chromatography
- K. Sterilization techniques
- L. Basic molecular biology techniques
- M. ELISA/ Multi mode Reader
- N. 2-D Gel Electrophoresis

**Paper IV: Writing and Presentation Skills (Sessional Paper, 50 marks, 4 credits)**

Writing a review of the literature related to the research problem followed by a presentation and defense