

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

	Name of Paper	Full Marks	Credits
BIOS C1	Research Methodology	50 marks	4
BIOS C2	Research and Publication Ethics - Critical Analysis of Scientific Literature	50 marks	4
BIOS C3	Care and Use of Common Laboratory Equipment/ Facilities	50 marks	4
BIOS C4	Writing and Presentation Skills	50 marks	4

Course runs for 1 semester

Detailed Syllabus

Paper-1: Research Methodology (Non-sessional Paper, 50 marks, 4 credits)

(A) Biosafety and ethics:

(i) Ethical use of animal subjects; (ii) Ethical use of human subjects; (iii) Stem cell ethics; (iv) The ethics of plant use and transgenic crops; (v) Agricultural ethics; (vi) Eco-sourcing: code of practice; (vii) Radioactive, chemical and biohazard safety, waste management and disposal.

(B) Statistical Methods:

(i) Numerical and graphical presentation of data; (ii) Measures of central tendency; (iii) Measures of dispersion; (iv) Testing of significance of hypothesis by student's t-test, paired t-test and Fisher's t-test; (v) Determination of correlation coefficient between two variables; (vi) Regression analysis of bivariate data using statistical software; (vii) Theories of probability; (viii) Analysis of variance; (ix) Post-hoc test; (x) Statistical distributions (Normal, binomial and Poisson distributions); (xi) Basic statistical modelling; (xii) Data presentation and handling in Excel; (xiii) image processing and calculations using Image J.

(C) Applications of Bioinformatics:

(i) Introduction to Bioinformatics; (ii) Bioinformatics data types; (iii) Sequence formats (e.g. raw text, FASTA, Stockholm); (iv) Sequence and structure databases (e.g. Genbank, PDB etc.); (v) Sequence alignments - pairwise and multiple; (vi) Basic Bioinformatics tools (BLAST, CLUSTALW etc.); (vii) Molecular visualization using Rasmol.

Evaluation will be conducted through continuous assessment and final written examination

Paper-II: Research & Publication Ethics - Critical Analysis of Scientific Literature (Non-Sessional Paper, 50 marks, 4 credits)

(A) Research and Publication Ethics [2 credits]:

- (a) Philosophy and Ethics (*THEORY*): (i) Introduction to philosophy: definition, nature and scope, concept, branches; (ii) Ethics: definition, moral philosophy, nature of moral judgements and reactions
- (b) Scientific Conduct (*THEORY*): (i) Ethics with respect to science and research; (ii) Intellectual honesty and research integrity; (iii) Scientific misconducts: falsification, fabrication and plagiarism (FFP); (iv) Redundant publications: duplicate and overlapping publications, salami slicing; (v) Selective reporting and misrepresentation of data, falsification of images
- (c) Publication Ethics (*THEORY*): (i) Definition, introduction and importance of publication ethics; (ii) Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. (iii) Conflicts of interest; (iv) Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types; (v) Violation of publication ethics, authorship and contributorship; (vi) Identification of publication misconduct, complaints and appeals; (vii) Predatory publishers and journals
- (d) Open Access Publishing (*PRACTICE*): (i) Open access publications and initiatives; (ii) SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies; (iii) Software tool to identify predatory publications developed by SPPU; (iv) Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.
- (e) Publication Misconduct (*PRACTICE*): Group discussions on - (i) Subject specific ethical issues, FFP, authorship; (ii) Conflicts of interest; (iii) Complaints and appeals: examples and fraud from India and abroad; Using Software tools - (iv) Anti-plagiarism tools like Turnitin, Urkund and other open source software tools
- (f) Databases and Research Metrics (*PRACTICE*): (i) Databases - Indexing databases, Citation databases: Web of Science, Scopus etc.; (ii) Research Metrics - Impact factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score, h-index, g index, i10 index, altmetrics; (iii) Citation of bibliography using Mendeley

(B) Critical Analysis of Scientific Literature [2 credits]:

- (a) 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 be taught by the proposed supervisor and at least two faculty members with similar research interests.

- (b) A formal written open-book examination will be taken based on critical analysis of the discussed research articles. Internal assessment will be based on the 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)

- (a) Writing a review of the literature related to the research problem
- (b) Presentation and defense of the review. Evaluation will be done by the proposed supervisor along with at least two other faculty members.