

School of Biotechnology, Presidency University

Syllabus for Ph.D. coursework

- Duration of Coursework: 1 semester
- All the papers are compulsory for the fulfilment of the coursework

Course Code	Title	Classification	Credit	Marks
BT-C1	Research methodologies in biotechnology	Non-sessional	4	50
BT-C2	Research and Publication Ethics, and Biosafety	Sessional	4 (2+2)	50 (25+25)
BT-C3	Application of bioinformatics and statistics, and Project proposal writing	Non-sessional	4	50
BT-C4	Journal presentation, and Discussion on recent reviews in biotechnology	Sessional	4	50
	Total credit and marks:		16	200

BT-C1: Research methodologies in biotechnology

64 h

Unit I: Recombinant DNA technology and techniques in genetic engineering

Unit II: Genomics and Next-Gen Sequencing technologies

Unit III: Proteomics

Unit IV: Biophysical techniques

Unit V: Mammalian cell culture techniques

Unit VI: Light and fluorescence microscopy techniques

Unit VII: Techniques in plant biotechnology

Unit VIII: Nanotechnology

BT-C2: Research and Publication Ethics, and Biosafety

64 h

A. Research and Publication Ethics

32 h

Philosophy and Ethics

Introduction to philosophy: definition, nature and scope, concept, branches

Ethics: definition, moral philosophy, nature of moral judgement and reactions

Scientific conduct

Ethics with respect to science and research

Intellectual honesty and research integrity

Scientific misconducts: falsification, fabrication, and plagiarism

Redundant publications: duplication and overlapping publications, salami slicing

Selective reporting and misinterpretation of data

Publication ethics

Publication ethics- definition, introduction and importance

Best practices/standards setting initiatives and guidelines: COPE, WAME etc; Conflicts of interest

Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa

Violation of publication ethics, authorship and contributorship

Identification of publication misconduct, complaints and appeals; Predatory publishers and journals

Open Access publishing

Open access publications and initiatives

SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies

Software tool to identify predatory publications developed by SPPU

Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester etc

Publication misconduct

Group discussion on Subject specific ethical issues, FFP, authorship; Conflicts of interest; Complaints and appeals: examples and fraud from India and abroad

Hands on training to use of plagiarism software like Turnitin, Urkund and other open source software tools

Databases and research matrices

Analyzing various Databases-Indexing databases; Citation databases: Web of Science, Scopus etc

Use of Software tools to analyze Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Citiscore; Analyzing Matrices- h-index, g index, i10 index, altmetrics

B. Biosafety

32 h

Introduction to institutional biosafety committee, animal ethics committee and human ethics committee and their purpose; Biosafety level categories

Handling of genetically modified organisms; Handling of laboratory chemical waste

Safety measurement for radioactive material used in biological systems.

BT-C3: Application of bioinformatics and statistics, and Project proposal writing

64 h

A. Application of bioinformatics and statistics

Unit I: Application of bioinformatics

Use of bioinformatics; Similarity and identity; Database search- types of databases, information retrieval system (Entrez and SRS), file formats, sequence, structure and pathway databases

Multiple Sequence Alignment, data searching tools for homologous sequences analysis - BLAST & FASTA;

Prediction tools- profile, motifs, domains identification, protein structure & functions prediction

Phylogenetic prediction: Phylogenetic tree construction - distance based method and character-based methods; Phylogenetic analysis package – MEGA; Homology modeling

Unit II: Application of statistics in research

Practice of statistical methods in biology; samples and populations; Data collection and graphical representation

Measures of central tendency- mean, median, mode

Measures of dispersion- range, mean deviation, coefficient of variation; standard deviation, standard error; Tests of statistical significance by student's t-test, paired t-test and Fisher's t-test

Probability; Populations and samples. Use of available biostatistics software.

B. Project proposal writing

Each scholar will prepare a grant proposal in a prescribed format. Instructor will mentor the preparation, the use of referencing software and anti-plagiarism software. The proposal and a presentation defending the proposal will be assessed by a committee of three faculty members.

BT-C4: Journal presentation, and Discussion on recent reviews in biotechnology

64 h

A. Journal presentation

Each scholar will present one or two recent (not older than 3 years) research article and will participate in the discussion during the departmental journal club. Assessment will be done continuously.

B. Discussion on recent reviews in biotechnology

Each faculty member will initiate discussion on one recent review in biotechnology related to his/her research field. Each scholar will choose 3 such teachers for learning those reviews and participating in group discussion. Assessment will be done based on the group discussion, assignments, and quizzes.