

w.e.f. : 2021

The University of Burdwan
Ph.D. course Work Syllabus in Biotechnology
Biotechnology – 1st Semester Course

Course Code	Course Title	Credit Value	Marks Distribution
			Total Marks
PHD CW 101	Research Methodology	4	50
PHDCW 102	UGC Research and Publication Ethics (RPE)	2	25
PHDCW 103	Compulsory/Optional Paper (Advance Biotechnology)	4	50
PHDCW 104	Term Paper(s) and related seminar presentation(s)	4	50 (25 + 25)
	Total	14	175

Paper 1: Research Methodology

4 Credit

Research

Objectives of Research, Types of Research, Research approach, Research Methods, Research Process, Research Design, Scientific writing, Thesis Writing, Paper Writing, Publication in Research journals, Research Institute, Research Schemes (minor & major), Preparation of project proposal, format, different funding agencies.

Basic Biostatistics

Measures of Central tendency & dispersion, Probability distribution, Sampling Errors, Levels of Significance, Regression & Correlation, Analysis of Variance, t-test, z-test, χ^2 test, Least Significant Difference test.

Computer application

Practical Knowledge of MS word; Construction of Spreadsheet from experimental data, MS EXCEL design & application of formula for calculations & their application to the experimental data, Preparation of Powerpoint Presentation based on the topic of research. Internet & its application, Application exploring various websites & Search Engine for collecting quality literature & Secondary data related to research work, Molecular Dynamics Simulation, Homology method.

Concept & application of Bioinformatics

Biological Databases- Primary & Secondary; Sequence databases (EMBL, Genbank, SWISSPROT), Protein Family Databases (PROSITE), Structure Database (PDB) Tools: BLAST, FASTA

Paper 2: UGC Research and Publication Ethics(RPE)

2Credit

THEORY

- **RPE 01: PHILOSOPHY OF ETHICS**
 1. Introduction of philosophy: Definition, Nature and scope, concept, branches
 2. Ethics: Definition, moral philosophy, nature of moral judgements and reactions
- **RPE 02: SCIENTIFIC CONDUCT**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification and Fabrication, and Plagiarism (FFP)

4. Redundant publications: Duplicate and overlapping publications, SalamiSlicing

5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS**

- 1. Publication ethics: Definition, introduction and importance

- 2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.

- 3. Conflicts of interest

- 4. Publication misconduct: Definition, concept, problems that lead to unethical behavior and vice-versa, types

- 5. Violation of publication ethics, authorship and contributorship

- 6. Identification of publication misconduct, complaints and appeals

- 7. Predatory publishers and journals

PRACTICE

- **RPE 04; OPEN ACCESS PUBLISHING**

- 1. Open access publications and initiatives

- 2. SHERPA/RoMEO online resource to check publisher copyright & self-achieving policies

- 3. Software tool to identify predatory publications developed by SPPU

- 4. Journal finder/journal suggestion tool viz., ZAME, Elsevier journal Finder, Springer journal suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT**

A. Group discussion

- 1. Subject specific ethical issues, FFP, authorship

- 2. Conflicts of interest

- 3. Complaints and appeals: Examples and fraud from India and abroad

B. Software tools

- Use of plagiarism software like Turnitin, Urkund and other open source software tools

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RPE 06: DATABASES AND RESEARCH METRICS

A. Databases

- 1. Indexing databases

- 2. Citation databases: Web of science, Scopus, etc.

B. Research Metrics

- 1. Impact Factor of journal as per journal Citation report, SNIP, SJR, IPP, Cite Score

- 2. Metrics: h-index, g index, i10 index, altmetrics

Paper 3: Compulsory/Optional Paper (Advance Biotechnology)

4 Credit

Sampling technique, Sterilization, Various methods of isolation of pure culture, methods for measurement of microbial growth, manipulation of environment, nutrient & genetic parameter, maintenance & precaution of microbes (Pure Culture).

Introduction to Cell & Tissue Culture; Preparation & set up of a Tissue Culture Laboratory, Media preparation, an idea about different types of cell culture, protoplast culture, haploid culture, micropropagation & cryopreservation,.

Techniques used in Biotechnology: Different types of Chromatographic and Spectroscopic techniques : Gel filtration, Ion exchange Chromatography, Paper Chromatography, TLC, GCMS, HPLC, UV-Vis Spectroscopy, Mass Spectrophotometry, Solution NMR & MALDI-TOF MS & application.

Gene amplification, Cloning & Expression, SDS & Native PAGE, RFLP, RAPD, AFLP, Real Time PCR, FISH.

Microscopy: Fluorescence, TEM, SEM, Confocal.

Paper 4: Term Paper(s) and related seminar presentation(s)
Credit

4

The candidate has to undertake a term paper in partial fulfillment of course work, under a faculty. Its documentation must be made as follows:

Term Paper:

Origin of the problem, review of literature (International & national status), possible methodology/proposed methodology to execute the work (must include experiments that candidate is planning with proper hints of possible outcome), time frame for work, expected outcome, list of references.

Seminar Presentation (related to submitted term paper)