

# SCHOOL OF STUDIES IN BIOTECHNOLOGY

**Pt. Ravishankar Shukla University  
Raipur 492010, Chhattisgarh**



## Syllabus

**Ph.D. Course Work in Biotechnology**  
(Program Code: 0410)

**Session**  
**2023-2024**

*Wishan*  
18/01/23

*Sanjay*  
18/01/23

*Amurkar.*  
18/01/23

*Ans*  
18/01/2023

## **Program Learning Outcomes for Ph.D. Course Work in Biotechnology**

1. Students will be able to develop a vision for the biotechnology field and its scope in R&D activities.
2. Students will become familiar with IPR, biosafety regulations and standards, and bioethics before commencing the research work.
3. Develop ability to design, analyze, interpret and present the research work/ data.
4. Will be acquainted with sophisticated instruments and technique essential required for various experimentations during the research.
5. Will have technical skill to write research papers, reviews, research projects, thesis, *etc.*

**School of Studies in Biotechnology**  
**Syllabus for Ph.D. Course Work in Biotechnology (2023-24)**  
**(Program Code: 0410)**  
**One Semester**

There will be two papers; each with 100 marks maximum.

**Paper-I (Code: 041001): Research Methodology, Advanced Tools & Techniques, Quantitative Data Analyses and Computer Fundamentals**

**Paper-II (Code: 041002): Review of Literature & Seminar**

<b>Paper- I(Code: 041001): Research Methodology, Advanced Tools &amp; Techniques, Quantitative Data Analyses and Computer Fundamentals</b>		<b>Maximum Marks</b>
<b>A</b>	<b>Research Methodology</b> Essential steps in research: Identification, Selection of objectives, case studies and practical knowledge of research process. Research design: - Components, importance of literature collection, citation & indexing. IPR, Experimental error and control, Research Report Presentation-table, Figure, Formatting and typing	<b>25.0</b>
<b>B</b>	<b>Advanced Tools/ Techniques&amp; their Applications</b> Electrophoresis, HPLC, Microscopy, PCR, Biosensors: Types, Application of biosensor, Biosafety cabinets; Protein sequencing, DNA sequencing, Radioisotope Techniques, Bioinformatics & Biological Databases.	<b>25.0</b>
<b>C</b>	<b>Quantitative Data Analysis</b> Measures of variability: Standard Deviation, Standard Error, Coefficient of Variation, Correlation and Regression, Test of Significant: t-test, chi-square test, Frequency distribution: Binomial and normal distribution, Statistical tools and techniques: MS Excel, SPSS.	<b>25.0</b>
<b>D</b>	<b>Entrepreneurship, Biosafety&amp; Bioethics</b> Entrepreneurship in bio-business: Introduction and scope in Bio-entrepreneurship, MSME, DBT, BIRAC, Make In India. Biosafety - introduction; primary containment for biohazards; biosafety levels; principles of environmental risk assessment. Bioethics – Human, plants, microbes and animal experimentation, biopiracy.	<b>25.0</b>
<b>Paper-II(Code: 041002): Review of Literature &amp; Seminar</b>		<b>Maximum Marks</b>
<b>A</b>	<b>Review of Literature- Writing review of literature in the area of the proposed Ph.D. program</b>	<b>50.0</b>
<b>B</b>	<b>Seminar-Based on the review of literature</b>	<b>50.0</b>

**Note:**

1. There will be FOUR units (A, B, C & D) of 25 marks each. The pattern will include both objective (multiple-choice questions) and subjective (short answer, using 50 to 100 words) questions.
2. The candidate should obtain 50% or more marks to qualify in the course work examination. Each answer paper will be assessed by two examiners independently.
3. Research and Publication Ethics: As per the UGC Notification [D.O. No.F.1-1/2018 (Journal/CARE), dated on December 2019]. This course (Annexure 01) will separately be taught and its examination will be conducted by the HRDC PRSU Raipur.



## Annexure 01:

### Syllabus THEORY

#### RPE 01: PHILOSOPHY AND ETHICS

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgments and reactions

#### RPE 02: SCIENTIFIC CONDUCT

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

#### RPE03: 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-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

#### RPE 05 : PUBLICAITON MISCONDUT

##### A. Group Discussions

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 (2 hrs.)

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

#### 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

**Learning Outcomes:**

1. Students will be able to think critically and creatively about the use of biotechnology to address local and global problems.
2. Able to write and present a technical report/document.
3. Will acquire mastery in the specific area of biotechnology and will be able to go for a collaborative and multidisciplinary research.
4. Will be able to apply gathered knowledge and management skills in managing research projects in efficient and economical manner and with intellectual integrity and ethics for sustainable development of society.

**Employability/ Skill Development:**

1. Will be capable to carry out research /investigation independently in specialized area of Biotechnology. Recognize the need of continuous learning, and will be prepared to create, select, learn and apply appropriate techniques, resources, and modern instrumentation to solve complex biotechnological issues with an understanding of the limitations.
2. Rigorous training on instrumentation, workshops, seminars, planning and execution of specific research leading to fruitful results, data analysis and interpretation, thesis and research paper writing, etc.