

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.



Circular / Syll. Sec./ A.C. Res./ Curriculum/ 2026.

It is hereby inform to all concerned that, on the recommendation of Board of Studies; the Academic Council at it's Meeting held on 28th July, 2026 has accepted the "Curriculum of Pre-Ph.D. Course Work as per Guidelines of University".

This is effective from the Academic Year 2026-27 and onwards as per appended herewith.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University campus,
Chhatrapati Sambhajanagar-431 004.
Ref. No. Syll. Sec./A.C. Res./
Curriculum/ 2026/ 2.2.-24f

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Deputy Registrar
Syllabus Section

Date: 31/ 07/ 2026.

Copy forwarded with necessary action to:-

- 1] **The Head, all concerned departments,**
- 2] **The Director, University Network & Information Centre, UNIC,**
with a request to upload this Circular on University Website.
- 3] **The Director, Board of Examinations & Evaluation,**
- 4] **Public Relation Officer [PRO],**

Dr. Babasaheb Ambedkar Marathwada University,
Chhatrapati Sambhajanagar.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajanagar – 431 004, Maharashtra, India



*Pre.Ph.D. Course Work Subject Wise Curriculum List
Under the Faculty of Science & Technology*

<i>Sr.No.</i>	<i>Curriculum/Subject</i>
01.	Biochemistry
02.	Biotechnology
03.	Botany
04.	Chemistry
05.	Computer Engineering
06.	Computer Science
07.	Environmental Science
08.	Food Technology
09.	Geology
10.	Mathematics
11.	Microbiology
12.	Pharmacy
13.	Physics
14.	Statistics
15.	Zoology
16.	Civil Engineering
17.	Electronics Engineering
18.	Mechanical Engineering
19.	Nanotechnology

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Pre-Ph.D. Course Work in Biotechnology

Ph.D. Course Work

PART I: Research Methodology in Biotechnology

Credits: 4

UNIT I: Foundations of Scientific Research

1.1 Introduction to Research: Meaning, objectives, and significance of research; Basic, applied, translational, and interdisciplinary research; Scientific method and scientific reasoning; Characteristics of good research

1.2 Research Problem Formulation: Identification of research problems; Research questions and objectives; Hypothesis generation and testing; Conceptual and theoretical frameworks

1.3 Literature Review: Sources of scientific information; Literature survey using databases viz. PubMed, Scopus, Web of Science, Google Scholar etc; Bibliometric indicators:

1. Impact Factor
2. h-index
3. CiteScore

UNIT II: Experimental Design and Biostatistics

2.1 Principles of Experimental Design

- Variables and controls
- Replication, randomization and blocking
- Laboratory and field experiments
- Sampling techniques

2.2 Descriptive Statistics:(Statistical Methods) - Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); sampling distribution; difference


10/08/2016
प्रा. भास्कर साठे,
अध्यापक,
विज्ञान व तंत्रज्ञान, विद्याशाखा
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ,
हवेली, धारशिव


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UNIT IV :Practical / Assignments

1. Literature review and presentation on a selected topic.
2. Preparation of a research proposal (other than your research topic).
3. Reference management using Mendeley/Zotero.
4. Scientific paper critique.
5. Seminar presentation followed by a viva voce on **topic chosen by the student and approved by RRC**

Recommended Books

1. **Kothari, C.R.** – *Research Methodology: Methods and Techniques*.
2. **Montgomery, D.C.** – *Design and Analysis of Experiments*.
3. **Holmes, Moody & Dine** – *Research Methods for the Biosciences*. (Amrita Vishwa Vidyapeetham)
4. **Ruxton & Colegrave** – *Experimental Design for the Life Sciences*. (Amrita Vishwa Vidyapeetham)
5. **Daniel, W.W.** – *Biostatistics: A Foundation for Analysis in the Health Sciences*.
6. **Day & Gastel** – *How to Write and Publish a Scientific Paper*.
7. **Rajasekar et al.** – *Research Methodology for Scientists*. (arXiv)


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UNIT - II

Molecular Biology Techniques:

PCR, RT-PCR and qPCR; DNA sequencing technologies; CRISPR-Cas systems; Gene expression analysis

Electrophysiological Methods - Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT. Computational methods: Nucleic acid and protein sequence database; data mining methods for sequence analysis, web-based tools for sequence searches motif analysis and presentation.

UNIT III

Research Tools, Data Science and AI in Biotechnology

3.1 Machine Learning Applications

- Supervised and unsupervised learning
- Classification and regression models
- Neural networks
- Deep learning in genomics and imaging

3.2 Artificial Intelligence in Biotechnology

- AI-assisted drug discovery
- Protein structure prediction
- Generative AI in biological sciences
- Precision medicine and predictive biology

3.3 Big Data Analytics

- High-throughput data handling
- Cloud computing for biological datasets


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References

- C.R. Kothari, IInd edition (2004) Research methodology, Methods and techniques, New Age International (P) Ltd, Publishers, New Delhi. Jerrod H. Zar (1999) Biostatistical analysis by, Prentice Hall International, Inc. Press, London.
- Attwood. T.K and Parry-Smith D.J. (2002) Introduction to Bioinformatics, Pearson education Singapore.
- Sharma.BK. Instrumental methods of chemical analysis.
- Upadhyay, Upadhyay and Nath, Biophysical chemistry.
- Khandpur R.S. Handbook of biomedical instrumentation, Tata Mc Graw Hill.
- Brigal.L. Williams, A biologist guide to principle and techniques of practical biochemistry.
- Montgomery, D.C. – *Design and Analysis of Experiments*.
- Field, A. – *Discovering Statistics Using R*.
- Lesk, A.M. – *Introduction to Bioinformatics*.
- Alon, U. – *An Introduction to Systems Biology*.
- Brown, T.A. – *Genomes 5*.
- National Academies of Sciences – *Fostering Integrity in Research*.
- Day and Gastel – *How to Write and Publish a Scientific Paper*.
- Current Reviews from Nature Biotechnology, Trends in Biotechnology, Cell, Science, and Nature Reviews Genetics.***


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