

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 Sambhajnagar-431 004
Ref. No. Syll. Sec./A.C. Res./
Curriculum/ 2026/ 2.24-24f

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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 Sambhajnagar.

Dr. Babasaheb Ambedkar Marathwada University,
Chhatrapati Sambhajnagar.

Dr.Babasaheb AmbedkarMarathwada University

Chhatrpati Sambhajanagar



Pre.Ph.d.course Subject wise curriculum List under the Faculty of Science & Technology.

Sr.No.	Curriculum/Subject
1.	Biochemistry
2.	Biotechnology
3.	Botany
4.	Chemistry
5.	Computer Engineering
6.	Computer Science
7.	Environmental Science
8.	Food Technology
9.	Geology
10.	Mathematics
11.	Microbiology
12.	Pharmacy
13.	Physics
14.	Statistics
15.	Zoology
16.	Civil Engineering
17.	Electronics Engineering
18.	Mechanical Engineering
19.	Nanotechnology
✓ 20.	Biophysics
21.	Pharmaceutical and Fine Chemical

Biophysics

Revised Syllabus for Pre Ph.D. Course Work (16 Credits)

Effective from academic year 2026-27

PhD scholars may complete their coursework through two distinct modes:

Traditional Offline Mode

or

Online Mode (via SWAYAM-NPTEL platform).

Paper I : 1) Research Methodology:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ge42

OR

2) Introduction to Biostatistics

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_bt61

Paper II : Swayam / nptel courses

1) Biophysical Chemistry :

https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_cy43

OR

2) Experimental Biotechnology

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_bt94

OR

3) Cell and Molecular Biology

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_bt91

Offline Mode

Part I : Research Methodology

Research Fundamentals:

Introduction: Definition, research career, essentials for research career, objectives of the research, characteristics of the research, what makes people to do research, importance of research, pre-requisite for research.

Identification of Research Problem:

Types of research, why-why analysis, defining the research problem: Identification of research problems, selection of research problem, facts one should know regarding selection of research problem, the process of research problem definition, some facts involved in defining research problem

Formulation of Research Problem:

Difficulties encounter while doing research, overview of science and the scientific method, empirical approach, essentials and dispensable in research, formulation of the problems: steps involved in defining a problem: i) Selection of problem/Broad topic for research ii) Literature review iii) Fine tuning of research topic iv) Formulation of hypothesis v) Formulation of objectives & Methodology of the study vi) Preparation for collection of data vii) Collection of data viii) Interpretation / analysis of data ix) Evaluation of data and testing of hypothesis x) Making corrections in hypotheses and repeating steps (v to ix) xi) Writing the report.

Research Report and drafting Research Proposal:

Types of research reports : Pre-Ph. D. Synopsis / Synopsis for Projects (beginning) , Ph. D. Synopsis (End) / Synopsis for Projects , Ph. D. Thesis / Project Report, Manuscript of Research Paper, Research Proposal for fellowship / funding, Outline of Pre-Ph. D. Synopsis ; Outline of Ph. D. Synopsis (End) / Synopsis for Project : ; Outline of Ph. D. Thesis / Project Report ; Introduction to research proposal writing: Overall Organization of Project Proposal, Essentials for a Funded Proposal, Key Aspects of Drafting Research Proposal, Research Continuum : Background Preparation for Research project, Criteria for Good Research Problem for Project, Overall Organization of Research Proposal, Title of Research Project, Abstract / Summary, Introduction / Background, Origin of the Proposal, Hypothesis, Goals and/or Objectives of Research, Specific Aims, Significance and Impact, Methodology, Work plan and schedule, Budget, All other Operating Grants, Ethical Considerations, Outcomes / Results and Beneficiaries, Bibliography / References and Annexures, Referees, Co-applicants, Applicant's CV details, General Thoughts, Format of UGC Project Proposal, Format of the Proposal under Extramural Research (EMR) Scheme of SERB, DST, ICSSR research proposal format, Indian Research Funding Agencies, General Foreign or International Funding Agencies, Opportunities for Research Scalars.

Drafting Scientific Manuscript:

Key aspects of drafting of scientific manuscript (Novelty, Social Relevance / National Importance, Credibility / Credential of Research Scholar, Drafting skills of Research Scholar), common content errors, useful resources, background (author's perspective), Author Publishing priorities, Identification of journal, Author Priorities for Journal Selection, Reader's priorities, ethical issues, style and language, article submission process, Manuscript Template, Title of the Manuscript, Title page, Abstract, Introduction, Experimental Details, Material and Methods, Statistical Methods, Results, Tables and Figures, Discussion, Acknowledgements/Funding, Reference section, General rules, After Submission, Overview of Peer Review Process, Publishing Tips, Final advice.

Quantitative and Statistical Methods

Data Collection:

Sources of Data – Primary and Secondary, Types of Data – Categorical (nominal and ordinal), Numerical (discrete, continuous, ratio and interval). Methods of Data Collection: Survey, Interviews (in-depth or Key Informant interviews), Focus Group Discussion (FGD), Observation, Records and Experimental Observations.

Sampling methods:

Basic of sampling, need of sampling method, sampling errors types of sampling (Probabilistic and Non Probabilistic sampling) and sample size. Design of questionnaire, validity and checking of questionnaire. Data processing, editing of data and data cleaning

Introduction of statistics

Functions – Limitations- Graphical representation with statistical software – Measures of central tendency - Arithmetic mean – Median – Mode, measure of dispersion – Range, quarter deviation , Standard deviation – Co-efficient of variation (Discrete series and continuous series) – Correlation, Types of correlation, Karl Pearson's correlation, Spearman rank correlation, coefficient of determination(R^2), Regression – Simple and Multiple Regression/ logistic regression, multicollinearity analysis, multivariate analysis :Principal component analysis, Discriminate analysis

Hypothesis testing:

Types of hypothesis, level of significance, errors in testing hypothesis, Parametric and Non Parametric Tests: Meaning and purpose of parametric test and non-parametric test.

Experimental Designs:

Meaning and purpose of basic experimental design and basic types of errors, basic principal of experimental design, types of basic design (CRD, RBD and LSD) and its need ANOVA one way and two way ANOVA , multiple comparison test. Basic of Factor-Analysis.

Parametric and Non Parametric Tests:

Meaning and purpose of parametric test and non-parametric test - Difference between parametric and non-parametric test, "H" test, its meaning, purpose; assumptions and uses, Analysis of variance technique of "F" test, Analysis of co-variance technique, Regression, step regression, χ^2 -test, its purpose and use, Median test and sign test.

Advanced Technique of Correlation:

Meaning and purpose of correlation, Correlational technique - Contingency, Phi-correlation, Person's correlation, Multiple-correlation, Factor-Analysis Technique with special reference to centroid method. Use of Statistical Software in data analysis

Statistical analysis:

By using SPSS (For Social Science) /R Programming (For Sciences and Technology): Introduction of SPSS/ R Programming, input of data and coding in SPSS/ R Programming.

□ Computer Application in Research:

Data Communication and Networks

Data communication concepts, local area network, wide area network, internet, intranet, extranet, website. E-mail, search engines-enterprise E-communication and E-collaboration

Using Internet for Research

The Internet: quick look, what is internet, Use of Internet, major internet services, electronic mail, www, downloading super tools for better computing Internet and the society, Use of E-Journals, Use of E-library, searching the keyword search engines, News and multimedia, governments, archives and statistics.

Introduction to Research Related Software's

Introduction to Data analysis software-SPSS: Definition, objectives and features, data analysis using SPSS: Data entry creating variables, switching to data labels, data analysis: Frequencies, recording into different variables, cross tabulations and layers. Core calculation software, developing utility programs for research, Introduction to C programming.

Research Related Tools and Utilities

MS-Office and its application, File handling in window, various versions of MS- Office, Research publishing tool- MS-Word, Adobe acrobat, Graphics tool- MS- Excel, MS-Power Point: Creating presentations and adding effects, Subject/field specific tools on www.freeware.com

References:

1. Research Methodology by Dr. S. L. Gupta, Hitesh Gupta; International Book House Pvt Ltd (2013), ISBN-10: 8191064278, ISBN-13: 978-8191064278
2. Basic Research Methods-Gerard Guthrie SAGE Publications, India, Pvt Ltd, New Delhi (2010), ISBN-10: 8132104579, ISBN-13: 978-8132104575
3. Research Methodology-methods and techniques By C. R. Kothari, New Age International Publishers (2011) ISBN 978-81-224-1522-3
4. Principles of Research Methodology- Phyllis G. Supino, Jeffrey S. Borer; Springer, Verlag New York (2012), ISBN-ebook: 1461433592, ISBN (Hardcover): 9781461433590
5. Research Design Qualitative, Quantitative. and Mixed Methods Approaches- John W. Creswell; SAGE Publications Ltd, UK (2011), ISBN-9780857023452
6. Research Methodology -A Step-by-Step Guide for Beginners- Ranjit Kumar; Sage Publications Ltd (2010), ISBN- 1849203016.
7. Scientific Writing and Communication- Angelika Hofmann; Oxford University Press, US (2010), ISBN-13-: 978-0 199947560, ISBN-10: 01 99947562
8. Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded- Joshua Schimel, Oxford University Press, (2011), ISBN: 9780199760237

9. Handbook of Scientific Proposal Writing- A.Yavuz Oruc; CRC Press, Taylor & Francis group (2011), ISBN: 9781439869185

Paper II

Centrifugal techniques: Basic principles, instrumentation, preparative & analytical ultracentrifugation methods

Spectroscopic techniques: Basic principles, instrumentation, applications of UV-Vis, IR, Raman, NMR, ESR, CD & ORD & Fluorescence, Mass spectroscopy

Chromatography & electrophoretic techniques: Basic principles, methodology & applications of TLC,HPTLC, Gel filtration, Gas & Affinity Chromatography, Agar gel, PAGE,SDS-PAGE & IEF etc.

Bio-Imaging techniques: Basic principles, instrumentation, applications of Microscopy – Light & Electron Microscope, Flow cytometry

Immunology and Immunotechniques:

Antigen, Antibody, Types of Immunoglobulins, Antigen -Antibody Interaction and its diagnostic applications.

References :

1. Instrumental Methods of Analysis. 6th Edition by H.H. Willard, L.L. Merritt Jr. and others. 1986. CBS Publishers and Distributors.
2. Instrumental Methods of Chemical Analysis. 1989 by Chatwal G and Anand, S.
3. Himalaya Publishing House, Mumbai.
4. A Biologists Guide to Principles and Techniques of Practical Biochemistry. 1975 by Williams, B.L. and Wilson, K.
5. Spectroscopy. Volume 1.Edited by B.B. Straughan and S. Walker. Chapman and Hall Ltd.
6. Chromatography: Concepts and Contrasts- 1988 by James Miller. John Wiley and Sons. Inc., New York.
7. Analytical Biochemistry by Holme.
8. Introduction to High Performance Liquid Chromatography by R. J. Hamilton and P. A.Sewell.
9. Spectroscopy by B.P. Straughan and S. Walker.
10. Practical aspects of Gas Chromatography and Mass Spectrometry 1984 by Gordon M.

Message, John Wiley and Sons, New York.

11. Analytical biotechnology edited by Thomas G M Schalkhammer.

12. Principles and techniques of biochemistry and molecular biology by Keith Wilson and Walker.



Chairman

(Vaishali N. Wadekar.)

Ad-hoc Board in Biophysics

