

- FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

Department of Biochemistry

Course Curriculum

PART- A: Introduction			
Program: Bachelor in Science <i>(Honors / Honors with Research)</i>		Semester - VIII	Session: 2024-2025
1	Course Code	BCSE - 12 T	
2	Course Title	Research Methodology	
3	Course Type	Discipline Specific Elective (Theory)	
4	Pre-requisite (if, any)	As per the Program	
5	Course Learning Outcomes (CLO)	<p><i>On successful completion of the course, the student shall be able to:</i></p> <ul style="list-style-type: none"> ➤ Understand, analyse the problem. ➤ Apply Scientific process know the cause of the problem. ➤ Apply different mathematical tools to correlate factors responsible for the problem. ➤ Apply knowledge of bioethics in research. 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	<p>Foundations of Research: Definition, purpose - Relevance and scope, Motivation and objectives – Research methods vs Methodology. Types of research- pure versus applied, incremental versus innovative; multidisciplinary research.</p> <p>Research Process and Design: Steps involved in research process; Identifying and defining research problems; Importance of literature review in defining a problem, Formulation of research objectives; Hypothesis, Research design- Meaning and need- induction - deduction. Features of good design- important concepts and different types; basic principles of experimental design.</p>		12
II	<p>Data Collection and Analysis : Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies – Measures of central tendency, standard deviation and standard error, ANOVA, Correlation, T test, Data Analysis with Statistical Packages, Generalisation and interpretation of results.</p>		11
III	<p>Scientific Reporting: Types of scientific reports – journal articles – Presentation at conferences- Thesis and dissertations – Books. Structure and components of scientific reports – Layout, Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication. Publication of scientific reports, Impact factor of Journals, h-index, i10-Index, g-index.</p>		10
IV	<p>Application of Results and Research Ethics: Commercialization – Copyright and Copy left – royalty - Intellectual property rights and patent law – Ethical issues - Ethics in human and animal experimentation. Guidelines for using animals in biological research- The Prevention of Cruelty to Animals Act, India. Scientific misconduct such as Fabrication, Falsification, Plagiarism and Self-Plagiarism; software for checking plagiarism. Conflicts of interests; Citation and acknowledgement - Reproducibility and accountability.</p>		12
Keywords	Research, hypothesis, Data analysis, impact factor, bioethics.		

Name and Signature of Convener & Members of CBoS:




PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended –		
<ul style="list-style-type: none"> ➤ Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research methodology, RBSA Publishers. ➤ Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p. ➤ Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p ➤ Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes. ➤ Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing. 		
PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		100 Marks
Continuous Internal Assessment (CIA):		30 Marks
End Semester Exam (ESE):		70 Marks
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

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1	Course Code	BCSE - 12 P	
2	Course Title	Research Methodology	
3	Course Type	Discipline Specific Elective (Practical)	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	<i>On successful completion of the course, the student shall be able to:</i> <ul style="list-style-type: none"> ➤ Understand, analyse the problem. ➤ Apply Scientific process to know the cause of the problem. ➤ Apply different mathematical tools to correlate factors responsible for the problem. ➤ Apply methods to represent results in scientific way. ➤ Apply knowledge of bioethics in research. 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> ➤ To prepare a word document of the Ph.D. synopsis with proper formatting. ➤ To prepare a word document of 20 references related to your Research work in a standard format. ➤ To write a short note on the importance of e-journals in research work using internet. ➤ Exercises for data distribution. ➤ Exercises for computation of measures of central tendency. ➤ Exercises for computation of measures of variability. ➤ Data analysis by ANOVA and multiple-range tests. ➤ Hypothesis testing by t-test, F-test, and Chi-square test. ➤ Graphical presentation of data using a suitable package. ➤ Statistical analysis of a data using a suitable package. ➤ Preparation of document using a suitable package. 		30
Keywords	Research, hypothesis, Data analysis, impact factor, bioethics.		

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PART-C: Learning Resources		
Text Books, Reference Books and Others		
<i>Text Books Recommended –</i>		
<ul style="list-style-type: none"> ➤ Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p ➤ Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes. ➤ Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing. 		
PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		50 Marks
Continuous Internal Assessment (CIA):		15 Marks
End Semester Exam (ESE):		35 Marks
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment D. Performed the Task based on lab. work - 20 Marks E. Spotting based on tools & technology (written) – 10 Marks F. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

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