

SEMESTER - IV

CODE	COURSE TITLE
18BOPC412	RESEARCH METHODOLOGY

Category	CIA	ESE	L	T	P	Credit
Core	25	75	70	5	-	4

Preamble

To understand some basic concepts of research and its methodologies

To study the methods of writing research articles

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Evoke the information about various principles, methodology and uses of instruments.	K1,K2
CO2	Acquire the knowledge of basic to advance microscopes.	K2,K3
CO3	Attain the statistical knowledge and their role.	K3, K4
CO4	Develop skill to select and define appropriate research problem and parameters	K3, K4
CO5	Enhance the skill to write a research report, thesis and proposal	K3,K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	M
CO2	M	S	S	S	S
CO3	M	S	M	S	M
CO4	S	M	M	S	S
CO5	S	M	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT - I **(15 hrs.)**

Lab techniques - Principles, methodology and uses of Spectroscopy - Infrared, Visible and NMR. Electrophoresis - Agarose gel - Blotting techniques - Microscopy – SEM - TEM and Fluorescent - Chromatography - HPLC.

UNIT - II **(15 hrs.)**

Lab techniques - Extraction – isolation – characterization, identification and quantification of secondary metabolites - Alkaloid – Flavonoids - Terpenoids and Glycosides.

UNIT - III **(15 hrs.)**

Biostatistics - Collection of data – Primary data – Secondary data. Presentation of data - Tabulation - graph. Measures of central tendency - Mean (only arithmetic) - Median - Mode. Measures of dispersion – Range - Standard deviation- Standard error. Probability – Theorems of probability. Student's 't' Test. Chi-square test - Analysis of variance (ANOVA - Theory only).

UNIT - IV **(15 hrs.)**

Research Methodology - Objectives of research - Types of Research- Significance of Research Process - Research Problems - Research Design – Sampling Design- Measurement and scaling techniques

UNIT - V **(15 hrs.)**

Interpretation and Report writing – Review of literature - Steps in writing report - layout of the report - Types of report - Mechanics of writing. Manuscript for publication and proof correction. Citation index, impact factor, h – index and plagiarism.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Kothari, C.R.	Research Methodology - Methods and Techniques	New Age International Publishers	2011, 2 nd Edition.
2.	Veerakumari, L.	Bio instrumentation	MJP Publishers, Chennai	2009, 1 st Edition.
3.	Saravanavel, P.	Research Methodology	Kitav mahal, New Delhi.	2010, 3 rd Edition.

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Misra,R.P.	Research Methodology- A Hand Book	Concept Publ Company , New Delhi.	2000, 1 st Edition.
2.	Zar, J.K.	Biostatistical analysis	Prentice-Hall Internatioinal, INC, Engleword chiffs, New Jersey.	1984, 5 th Edition.
3.	Vijay upagade and Arvind Shende	Research Methodology,	Chand & Co., New Delhi.	2010, 1 st Edition.
4.	Kaur, H.Pragati	Instrumental methods of chemical analysis,	Prakashan, Meerut.	2001, 6 th Edition.

Web Resource

https://serc.carleton.edu/research_education/geochemsheets/techniques/SEM.html

<https://www.sciencedirect.com/topics/biochemistry-genetics-and.../secondary-metabolite>

<udel.edu/~mcdonald/HandbookBioStat.pdf>

<https://www.qualtrics.com/blog/research-problem/>

<https://researchguides.uic.edu/c.php?g=252299&p=1683205>

Pedagogy

Lecture - Chalk & Talk, PPT, Quiz, Assignment, Group Discussion, Seminar, collection of data.