

PCMBK20: RESEARCH METHODOLOGY

Year : II SEM: III	Course Code PCMBK20	Title Of The Course Research Methodology	Course Type Theory	Course Category Core	H/W 5	Credits 4	Marks 100
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Course Objective:

To provide the learners knowledge about the concept of research, its importance and learn the art of thesis, paper writing and publication.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Explain basic concepts of research and its methodologies.

CO2: Identify the relationship between methodology, framework and data collection.

CO3: Analyze the diverse cases using statistical methods.

CO4: Use of digital library as a resource of microbiological research.

CO5: Discuss the principles and algorithms of pairwise and multiple alignments, and sequence database searching.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	L	L	H
CO2	H	H	H	L	L	H
CO3	H	H	H	L	L	H
CO4	H	H	H	L	L	H
CO5	H	H	H	L	L	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	H	L	H
CO2	H	H	H	H	L	H
CO3	H	H	H	H	L	H
CO4	H	H	H	H	L	H
CO5	H	H	H	H	L	H

H – High (3), M – Moderate (2), L – Low (1)

COURSE SYLLABUS:

UNIT-I: Methodologies in Research.

(15 hours)

- 1.1 Research Methodology - Meaning and importance. Statement, Constraints. (K1,K2)
- 1.2 Review of literature - Review and synopsis presentation. (K1,K2,K3,K4,K5,K6)
- 1.3 Types of research, Research tools, Qualities of a good researcher. (K1,K2,K3,K4,K5,K6)
- 1.4 **Research process, Research designs** – Experimental and non-experimental. (K1,K2,K3,K4,K5,K6)
- 1.5 Preparation of research report. Guidelines for preparing an article. (K1,K2,K3,K4,K5,K6)

1.6 Computers in biological research- Plagiarism checking softwares. (K1,K2,K3,K4,K5)

UNIT-II: Data Collection and Analysis. (15 hours)

2.1 Introduction to Data collection. (K1,K2)

2.2 Source of data- Primary and Secondary. (K1,K2,K3,K4,K5)

2.3 Types of classification of data. (K1,K2,K3,K4,K5)

2.4 Tabulation of data. (K1,K2,K3,K4,K5,K6)

2.5 Diagrammatic representation of data (line, bar diagram, pie diagram, pictogram and cartogram). (K1,K2,K3,K4,K5,K6)

2.6 Graphical representation of data. (K1,K2,K3,K4,K5,K6)

UNIT-III: Statistical Methodology-I. (15 hours)

3.1 Introduction to statistical methodology in research. (K1,K2)

3.2 Measures of central tendency – mean, median, mode. (K1,K2,K3,K4,K5)

3.3 Standard deviation. (K1,K2,K3,K4,K5)

3.4 Correlation – coefficient of correlation (Karl Pearson method, group bi –variable data). (K1,K2,K3,K4,K5)

3.5 Coefficient of variation. (K1,K2,K3,K4,K5)

3.6 Probability. (K1,K2,K3,K4)

UNIT-IV: Statistical Methodology-II. (15 hours)

4.1 ANOVA (one way and two ways). (K1,K2,K3,K4,K5)

4.2 Chi square test. (K1,K2,K3,K4,K5)

4.3 Student's T test. (K1,K2,K3,K4,K5)

4.4 Testing of hypothesis-null hypothesis- level of significance-standard error. (K1,K2,K3,K4,K5)

4.5 F Test Web. (K1,K2,K3,K4,K5)

4.6 Resources for Microbiology – Use of Digital Library. (K1,K2,K3,K4)

UNIT-V: Bioinformatics. (15 hours)

5.1 Bioinformatics - Introduction and skills for a bioinformatician. (K1,K2)

5.2 Biological databases- An introduction. (K1,K2,K3)

5.3 Database searching, Sequence analysis, Pair alignment. (K1,K2,K3,K4)

5.4 Visualizing protein structures. (K1,K2,K3,K4)

5.5 Predicting structure and function of protein using sequences. (K1,K2,K3,K4)

5.6 Tools for genomics and proteomics. (K1,K2,K3,K4)

TEXT BOOKS:

1. Kothari, C.R., (1988). Research methodology, 2nd edition. Wiley Eastern Ltd., New Delhi.
2. Anderson, J., Duros, B.H. and Poole, M. (1986). Thesis and assignment writing, 1st edition, Wiley Eastern Ltd., New Delhi.
3. Gurumani N. (2002). Research Methodology for Biological sciences, MJP publishers, Chennai. 2006.

REFERENCES BOOKS:

1. Frederic H. Erbisch, Karim M. Maredia (2004). "Intellectual Property Rights in Agricultural Biotechnology", CABI Publisher. London
2. Felix Thiele, Richard E. Ashcroft (2005). "Bioethics in a Small World". Springer. USA
3. John Bryant (2002) "Bioethics for Scientists". John Wiley and Sons Publisher. New York
4. Mittal D.P. (1999). "Indian Patents Law". Taxmann Allied Services (p) Ltd. New Delhi

OER:**DIGITAL LIBRARIES:**

1. <http://www.loc.gov/>
2. <http://library.clark.edu/>
3. <http://www.dli.ernet.in/>
4. <http://www.loc.gov/education/>