

COURSES OF STUDIES (STATISTICS)

Ph.D PROGRAM
(UNDER SEMESTER SYSTEM)
(Effective from the Session (2025-2026))



SCHOOL OF STATISTICS
GANGADHAR MEHER UNIVERSITY,
SAMBALPUR-768004, ODISHA

SEMESTER SYSTEM OF Ph.D STATISTICS

SEMESTER-I

Paper-711

STATISTICAL INFERENCE

Theory-Compulsory

Marks-20+80 (4 CH)

Unit-I

Sufficiency and Completeness:

Sufficient statistics, Fisher's information measure, Minimal sufficient statistics, Complete Statistics, Exponential families of distribution, Pitmann families of distribution.

Testing of Statistical hypothesis:

Generalised Neyman-Pearson(GNP) Lemma, Tests of One Parameter Exponential Family of distributions, Locally most powerful tests, UMPU Tests for multi-parameter exponential family of distributions.

Unit-II

Bayesian Approach:

Prior and posterior distributions, Non-informative priors, Point estimation, Hypothesis testing, Decision theory approach.

Unit-III

Non-Parametric Methods:

Non-parametric Estimation-Empirical distribution function, U-Statistics. Non-Parametric tests-Single sample problems, Two sample problems, K-sample problems, Asymptotic Relative Efficiency(ARE)

Unit-IV

Likelihood Ratio Methods and Sequential Procedure:

Likelihood Ratio Test, Asymptotic distribution of Likelihood Ratio Test Criterion, Likelihood Ratio test for categorical data, Test for consistency.

Sequential probability ratio test (SPRT), Operating Characteristic (OC) and Average Sample Number (ASN) function of SPRT, Properties of SPRT, SPRT for Composite Hypothesis.

Text Books :

1. Rao, C.R- Linear Statistical Inference and its Applications: John Wiley & Sons.
2. Rajagopalan, M. Dhanavanthan, P -Statistical Inference: PHIL earning (P) Ltd.

Suggested Readings:

1. Mood A.M, Gragbill F.A. and Boes D.C-Introduction to Theory of Statistics, Mc Graw Hill.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B.: An Outline of Statistical Theory, Vol.-II, World Press.

SEMESTER SYSTEM OF Ph.D STATISTICS

SEMESTER-I

PAPER-712

RESEARCH AND PUBLICATION ETHICS

Marks-20+80(6 CH)

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- Mphil., Ph.D students and interested faculty members (It will be made available to post graduate at later date)

Fees:

- As per University rules

Faculty:

- Interdisciplinary Studies

Qualification of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years of teaching experience.

About the course

Course Code: CPE-RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course Structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 1. Introduction to philosophy: definition, nature and scope, concept, branches.
 2. Ethics: definition, moral philosophy, nature of moral judgments and reactions
- **RPE 02: SCIENTIFIC CONDUCT (5 hrs.)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 4. Redundant publications: duplicate and overlapping publications, salami slicing
 5. Selective reporting and misrepresentation of data
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
 1. Publication ethics: definition , introduction and importance
 2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: definition, concept, problem that lead to unethical behavior and vice versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING (4 hrs.)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU
 4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, ertc.
- **RPE 05: PUBLICATION MISCONDUCT (4 hrs.)**
 - A. Group Discussions (2 hrs.)**
 1. Subject specific ethical issues, FFP, authorship
 2. Conflicts of interest
 3. Complaints and appeals: examples and fraud from India and abroad
 - B. Software tools (2 hrs.)**

Use of plagiarism software like Turnitin, Urkund and other open source software tools
- **RPE 06: DATABASES AND RESEARCH METRICS (7 hrs.)**
 - A. Databases (4 hrs.)**
 1. Indexing databases
 2. Citation databases: Web of Science, Scopus, etc.
 - B. Research Metrics (3 hrs.)**
 1. Impact Factor of Journal as per Journal Citation Report, SNIP, SJR,

- IPP, Cite Score
2. Metrics: h-index, g index, i10 index, almetrics

References

- Bird , A. (2006). Philosophy of Science, Routledge.
- MacLntyre, Alasdair (1967). A Short History of Ethics. London.
- P. Chaddah, (2018). Ethics in Competitive Research: Do not get scoped; do not get plagiarized, ISBN: 978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academic Press.
- Rensik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieves from <https://www.neih.gov/research/resources/bioethics/whatis/index.cfm>
- Bcall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7. http://www.insindia.res.in/pdf/Ethics_Book.pdf

SEMESTER SYSTEM OF Ph.D STATISTICS

SEMESTER-I

PAPER-713

RESEARCH METHODOLOGY

Marks-20+80(4 CH)

Unit-I

IPR AND CYBER LAW.

- i) Patents, Patent laws, process of patenting a research finding
- ii) Intellectual property (IP), Intellectual property right (IPR)
- iii) Copyright, Trademarks, GI
- iv) Cyber laws
- v) COPE

Unit-II

QUANTITATIVE DATA ANALYSIS

- i) Types of Data, Data Collection – Methods and Tools
- ii) Hypothesis testing
- iii) Normal and Binomial distributions and their property
- iv) Tests of significance: Student *t*- test, *F*- test, *Chi-square* test
- v) Correlation and Regression
- vi) ANOVA – One-way and Two-way, Multiple-range test

Unit-III

COMPUTER FUNDAMENTALS

- i) Introduction to MS-Office software: MS-Word(Track change)
- ii) MS-Excel
- iii) MS-Power Point
- iv) Features for Statistical Data Analysis Tool Pack, SPSS
- v) Tables, Figures and Pictures using Excel
- vi) Preparation of Posters
- vii) Electronic submission of manuscripts
- viii) Communication skills, oral and poster

Unit-IV

- i) Basic Introduction to MATLAB Language
- ii) System Introduction Command Window Operations array Manipulation and Data handling MATLAB Operators Symbolic Math Tool Box
- iii) 2-D plotting
- iv) Script Files, Functions and Function Files
- v) MATLAB Programming, 3-D Plots, Numerical Methods using MATLAB

Recommended Books:

BK Sharma	Instrumental methods of analysis
Buranen L and Roy AM in a Post-	Perspectives on Plagiarism and Intellectual Property Modern world.
Cassel P et al.	Inside M.S Office Professional
Chatwal and Chatwal	Instrumentation
Coleman P and Dyson P	Mastering Internets
CR Kothari	Research Methodology: Methods & Technique 2008
Gilmore B	Plagiarism: why it happens, How to prevent it?
Gralia P	How the Internet works.
Habraken J M.S	Office 2003 All in One, M.S Office 2010 in Depth
Kumar Anupa P	Cyber Law
R Panneerselvam	Research Methodology
Rudra Pratap	Getting started with MATLAB : A quick
introduction for	Scientists and Engineers, Oxford Univ. Press 2002.
A. Gilat	MATLAB- An introduction with Applications,
wiley, 2004	
Snedecor GW & Cochran WG	Statistical Methods
Sood V	Cyber Law Simplified
Sumner M	Computers: Concepts & Uses
Upadhyaya and Upadhyaya	Instrumentation
White R How	Computers Work.

SEMESTER SYSTEM OF Ph.D STATISTICS

SEMESTER-I

PAPER-714

REVIEW OF LITERATURE

Marks-200 (150+25+25) (8 CH)

- i) Report Writing -150 Marks
- ii) Seminar Presentation of Report – 25 Marks
- iii) Viva-Voce-25 Marks