On-line Course on

Research methodology, Research and Publication ethics

August 10, 2026 to December 02, 2026

Every Monday, Wednesday and Friday

Time: 16:00 to 17:00 hrs

Course Coordinator: Prof. Dipanwita Dutta, Associate Dean, HBNI

Email: ddutta08@hbni.ac.in, dutta.dipa@gmail.com

Target students: Research scholars

Students desirous of attending the course have to register on Anuvidhya Website (www.Anuvidhya.in) before August 09, 2026.

Module	Faculty	Dates (Time: 1600-1700 hrs)
Module A: Research Methodology (15 lectures)	Lecturer 1	August 10, 12, 14, 17, 19, 21, 24, 28 September 02, 04, 07, 09, 11, 16, 18
Module B: Research and Publication ethics (30 lectures)	Lecturer 2 Lecturer 3	September, 21, 23, 25, 28, 30 October 05, 07, 09, 12, 14, 16, 19, 21, 23, 26 October 28, 30, November 02, 04, 06, 09, 11, 13, 16, 18, 20, 23, 27, 30 December 02

Lecturer 1: Dr. Babita Tiwari, Assistant Dean, HBNI (Extn: 23618)
Lecturer 2: Dr. Sohrab Abbas, SO/G, SSPD, BARC (Extn: 26282)
Lecturer 3: Dr. Sugam Kumar, SO/G, SSPD, BARC (Extn: 24400)

Final Exam: December 21, 2026 (Monday)

Research methodology, Research and Publication ethics

A: preamble

University Grants Commission in its 543rd meeting held on August 9, 2019 approved credit Courses for awareness about publication ethics and publication misconducts entitled "Research and Publication ethics" (RPE) to be made mandatory for all Ph.D. students for pre-registration course work. Accordingly, a course on Research Methodology, encompassing the RPE course is proposed to be introduced in all CIs/OCC of HBNI. The course will be of 45 lectures (HBNI- 6 credits)/ (UGC- 3 credits) and will have two modules, as described below.

Module A: Research Methodology (15 Lectures, 1 Credits)

Module B: Research and Publication Ethics (30 Lectures, 2 Credit)

It is proposed to conduct an interactive on-line course on Research Methodology, Research and Publication ethics (Module A and Module B) with 3 credits.

B. Target students:

Ph.D. students in all disciplines in all CIs/OCC, who are interested to attend this on-line course are welcome to register.

C. Course structure: The modules A and B will be completed in 45 lectures of one hour each. The course will be of 500 level.

D. Syllabus

Module A: Research Methodology (15 Lectures, 1 Credits)

Objectives and Types of Research: Motivation and objectives; Research methods vs. Methodology; Types of research: Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical; Stages of research; Research philosophy; Theory development; Research process.

Value of Statistics in Research: Probability distributions: discrete and continuous; Normal distribution; Standard normal probability curve; Hypothesis testing: Definitions, basic concepts, procedure and flow diagram for hypothesis testing; Limitations of hypothesis testing; Important parametric tests.

Accuracy; Precision; Confidence interval, confidence limit and confidence level; Errors and Uncertainties: Classification of errors; Minimization of errors; propagation of errors; Tests for outliers; Limitation of analytical methods; Significant figures and rounding off rules; Reporting the results; Comparison of results: Z-test, students' t-test; F-test; Chi Square test for goodness of fit; Basic principles of analysis of variance; Setting up the ANOVA table,

one way and two-way ANOVA; Use of statistical packages; Measure of asymmetries and other measures; Correlation and regression.

Determining experimental and sample designs; Measurement and scaling; Validity, reliability and practicality; Field work: The Nature of Field Work, Selection and Training of Investigators, Field Operation, Field Administration, Sampling frame and Sample selection.

Module B: Research and Publication Ethics (30 Lectures, 2 Credit)

Research Formulation and Design: Defining and formulating the research problem; Selecting the problem; Necessity of defining the problem; Importance of literature review in defining a problem; Literature review; Primary and secondary sources; reviews, treatise, monographs, patents, web as a source, searching the web; Critical literature review; Identifying gap areas from literature review; Development of working hypothesis, Research design; Basic Principles; Need of research design; Features of good design; Important concepts relating to research design; Observation and Facts; Laws and Theories, Prediction and explanation, Induction, Deduction; Development of Models; Collection of data through questionnaire and schedules; Collection of secondary data; Selection of appropriate method for collection, Guidelines for developing questionnaire; Successful interview; Survey v/s experiment; Developing a research plan - Exploration, Description, Diagnosis; Experimentation: Proper approach, Importance of recording observation, Maintaining the records, Sample history, Transparency in data recording.

Research Ethics: Philosophy and ethics, Ethics with respect to Science and research, Intellectual honesty and research integrity, Application of results and ethics - Environmental impacts - Ethical issues - ethical committees - Commercialization - Scientific misconducts-fabrication, falsification, duplicate and overlapping publications, selective reporting and misrepresentation of data.

Publication Ethics: Definition, introduction and importance, Best practices, standards setting initiatives and guidelines, Conflict of interest, Publication misconduct, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, predatory journals and publishers. Plagiarism - Citation and acknowledgement - Reproduction of published material & and accountability.
Open Access Publications, Indexing Databases, Citation Databases: Web of Science, Scopus, Google Scholar etc. Impact Factor of Journals, CiteScore, h-index, i10 index etc.

Intellectual Property Rights (IPR): Intellectual property rights and patent law, Copy right - Royalty -Trade Related aspects of IPRs. Patent procedures in DAE.

Reporting and Thesis Writing - Structure and components of scientific reports - Types of report - Technical reports and thesis - Significance - Different steps in the preparation - Layout, structure and Language of typical reports - Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation - Planning - Preparation - Practice - Making presentation - Use of visual aids - Importance of effective communication -Computers in Chemistry, Usage of packages such as, Excel, AIM2000, ChemCraft, etc. Manuscript drafting based on ‘Experimental data and Literature Survey’.

References

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[2] Kothari, C.R., 2000, Research Methodology: Methods and Techniques. New Age International.

[3] Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, ESS Publications (2 volumes)

[4] R. Paneer Selvam - Research Methodology Prentice Hall India Learning Private Limited; Second edition (2013)

[5] Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.

[6] Day, R.A., 1992.How to Write and Publish a Scientific Paper, Cambridge University Press.

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[10] P. Chaddah, 2018, Ethics in competitive research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865.