

PRE - Ph.D. SYLLABUS (2020 -21)

DOCTOR OF PHILOSOPHY IN APPLIED MATHEMATICS



BABA GHULAM SHAH BADSHAH UNIVERSITY RAJOURI, J&K, INDIA

COURSE SCHEME

COURSE CODE	COURSE TITLE	NO. OF CREDITS	TOTAL MARKS
PHDMS - 121	Research Methodology	4	100
PHDMS - 123	Approximation Theory	4	100
PHDMS - 124	Research and Publication Ethics	2	50
	TOTAL	10	250

Course Title	Research Methodology	Maximum Marks	100
Course Code	PHDMS-121	University Examination	100
Credits	4	Duration of Exam.	3 HOURS

Objectives The aim of this course is to introduce the students to the fundamental terminology and techniques of research.

UNIT Perception of Research Meaning, definition, characteristics, functions, objectives, classification of research.

01

Assortment of problem Reflective and scientific thinking, sources of problems, criteria for selection of the problem, definition, evolution and characteristic of a problem, research proposal and criteria for evaluating problem.

UNIT Appraise of related Meaning, Needs and objective of review of literature, Principles and procedure and review of literature, Nature of review of literature, resources of review of literature, functions of review of literature, method of conducting review of literature.

02 Literature

Research Planning and Sampling Meaning and definition of research plan, Design format for a research proposal, characteristics of a good research design, potential problem in research design. Meaning and definition of sampling, function of population of sampling, types of sampling design, probability sampling, characteristics of a good sample, the sampling cycle, reliability of sampling.

UNIT Survey Method Meaning and definition of method, the scientific method, types of research methods, purpose and uses of survey method.

03

Experimental Method Meaning and definition of experimental method, law of simple variable, concept of cause and effect, types of variable, the step of experimental method, classification of experiments, characteristics of a good experimental method.

UNIT Case study method Definition and objectives of case study, criteria for good case study, sources of case data, rationale of case studies, the steps of case study, case study vs statistical method, applications of case study.

04

Genetic Method Meaning, purpose and types of genetic method, sources of genetic data, analysis and interpretation of genetic data.

Tools of research Questionnaire, schedule, rating scales, tests.

UNIT Collection of Data Need and meaning of data collection, difference between facts and data, nature of data, constant, variable, variate, quantitative variable, types of data, data collection, organization of data.

05

Analysis of Data Statistical Analysis of data, descriptive data analysis, inference data analysis.

Research Report Need of research report, general format of research report, mechanics of report writing, writing research abstract, writing research paper.

Note for Paper Setting

The question paper will contain 10 questions, two from each unit and the candidate will be required to answer one from each unit. Each question carries twenty marks.

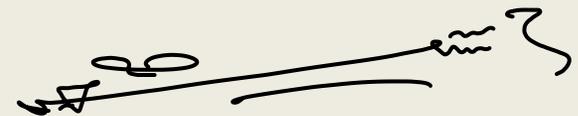
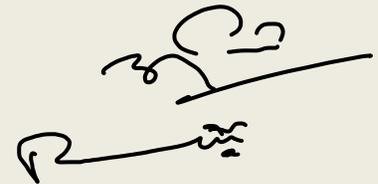
BOOKS RECOMMENDED

S. NO.	Title of the book	Author(s)	Publisher	Edition
1	Fundamental of Research Methodology and Statistics	Yogesh Kumar Singh	New age International publisher
2	Statistics for Research	Dowdy, Wearden, and Chilko	Wiley series in probability and Statistics	Third
3	Distribution Parameter System: Modeling and Identification, Lecture Notes in Control and Information Sciences	P.K.C. Wang	Springer

Departmental Research Committee

S. NO.	Name of the Member	Designation
1	Prof. G.M. Malik	Dean, School of Mathematical & Computer Sciences
2	Dr. Zaheer Abbas	Head, Department of Mathematical Sciences
3	Dr. Javid Iqbal	Faculty, Department of Mathematical Sciences
4	Dr. Ram Singh	Faculty, Department of Mathematical Sciences
5	Dr. Mudassir Rashid	Faculty, Department of Mathematical Sciences

Signature



Course Title	Approximation Theory	Maximum Marks	100
Course Code	PHDMS-123	University Examination	100
Credits	4	Duration of Exam.	3 HOURS

Objectives

The aim of this course is to introduce the area of Approximation Theory including some recent developments,

UNIT Abstract Spaces
01

Normed Linear spaces, Banach spaces with examples in function spaces, Dense set, Bounded Linear operators, Hahn-Banach Theorem, Open Mapping Theorem, Closed Graph Theorem, Uniform Boundedness Principle, Inner product spaces, Hilbert spaces with examples, Adjoint operators, Dual spaces, Reisz Representation theorems for $C[a; b]$.

UNIT Characterization of
02 Approximations

Best approximation in Normed spaces, Weirstrass approximation theorem; Positive linear operators and functionals; Different types of modulus of continuity; Chebyshev conditions to choose test functions; Korovkin type approximation theorems; Pointwise convergence and uniform convergence, Modulus of Continuity, Estimates with Second Order Moduli.

UNIT Bernstein operators
03

Estimates for the Bernstein Operators, Bernstein Stancu operators; Bernstein Shurer operators; Bernstein Kantorovich operators and other positive linear operators, Bezier curves and surfaces; De-Casteljau algorithm; Degree Elevation.

UNIT Introduction to q-
04 Calculus

q-integers; q-binomial; q-derivatives; q-integration etc. q-analogue of different positive linear operators and related approximation theorems.

UNIT Introduction to (p; q)-
05 Calculus

(p; q)-integers, (p; q)-binomial; (p; q)- derivatives; (p; q)-integration etc.; (p; q)-analogue of different positive linear operators and related approximation theorems.

Note for Paper Setting

The question paper will contain 10 questions, two from each unit and the candidate will be required to answer one from each unit. Each question carries twenty marks.

BOOKS RECOMMENDED

S. NO.	Title of the book	Author(s)	Publisher	Edition
1	Introductory Functional Analysis with Applications	Erwin Kreyszig	Wiley India Pvt Ld.
2	Fundamentals of Approximation Theory	Hrushikesh N. Mhaskar & Devidas V. Pai	Narosa
3	Linear operators and Approximation theory	P.Ā. Korovkin	Hindustan Publishing Corporation, Delhi
4	Approximation Theory and Methods	M.J.D Powell	Cambridge University Press

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3	Dr. Javid Iqbal	Faculty, Department of Mathematical Sciences
4	Dr. Ram Singh	Faculty, Department of Mathematical Sciences
5	Dr. Mudassir Rashid	Faculty, Department of Mathematical Sciences

Signature

Course Title	Research and Publication Ethics	Maximum Marks	50
Course Code	PHDMS-124	University Examination	50
Credits	2	Duration of Exam.	2 HOURS

Objectives The aim of this course is to make the students aware about the publication ethics and publication misconducts.

UNIT 01 **Philosophy & Ethics (Theory)** (i) Introduction and Philosophy - Definition, Nature and Scope, Concept, Branches (ii) Ethics - Definition, Moral philosophy Nature of moral Judgments and reactions.

Scientific Conduct (Theory) (i) Ethics with respect to science and research (ii) Intellectual honesty and research integrity (iii) Scientific Misconducts - Falsification, Fabrication and Plagiarism (FPP) (iv) Redundant Publications - Duplicate and overlapping publications, Salami slicing (v) Selective reporting and misrepresentation of data.

UNIT 02 **Publication Ethics (Theory)** (i) Publication Ethics - Definition, introduction and importance (ii) Best practices / standards setting initiatives and guidelines COPE, WAME, etc (iii) Conflicts of interest (iv) Publication Misconduct - definition, concepts, problems that lead to unethical behavior and vice versa, types (v) Violation of publication ethics, authorship and contributorship (vi) Identification of publication misconduct, complaints and appeals (vii) predatory publishers and Journals.

Open Access Publishing (Practice) (i) Open access publications and initiatives (ii) SHERPA/ RoMEO online resource to check publisher copyright and self-archiving policies (iii) Software tool to identify predatory publications developed by SSPU (iv) Journals finder journal suggestion tools viz JANE. Elsevier journal Finder, Springer Journal Suggester etc.

UNIT 03 **Publication Misconduct (Practice)** **Group Discussions:** (i) Subject specific ethical issues, FFP, authorship (ii) Conflicts of interest (iii) Complaints and appeals - Examples and fraud form India and Abroad.

Software Tools: Use of plagiarism software like Turnitin, and other open- source software tools

Database & Research Metrics (Practice) **Data Bases:** (i) Indexing databases (ii) Citation databases - web of science, Scopus etc

Research Metrics: (i) Impact factor of Journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score (ii) Metrics: h-index, g-index, i10-index, almetrics

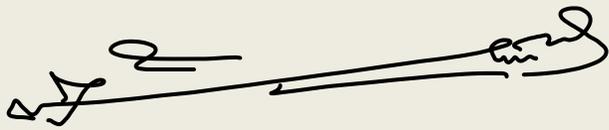
Note for Paper Setting

The question paper will contain 03 questions, two from each unit and the candidate will be required to answer one from each unit. Each question carries twenty marks.

REFERENCES

S. NO.	Title of the book	Author(s)	Publisher	Edition
1	Philosophy of Science	A. Bird	Routledge	
2	A short history of ethics	MacIntyre	London	
3	Ethics in competitive research: Do not get scoop ed. Do not get polarized	P.Chaddah	Self Published	
4	What is ethics in research and why is it important	D.B. Resik	National Institutes of Health. https://www.niehs.nih.gov/research/resources/bioethics/whatis	
5	On Being a Scientist: A Guide to Responsible Conduct in Research	Committee on Science, Engineering, and Public Policy; National Academy of Sciences; National Academy of Engineering; Institute of Medicine	National Academic Press	Third
6	Predatory Publishers Are Corrupting Open Access	J. Beall	Nature	
7	Ethics in Science Education, Research and Governance	Committee	Indian National Science Academy	

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