MA ENGLISH

PH.123.1 - PAPER III: RESEARCH METHODOLOGY AND ETHICS

HARD CORE: 4 CREDITS **CONTACT HOURS: 60**

CO 1: To introduce the students to the basics of doing research.

CO 2: The paper will focus on how to use the correctly write and document the thesis

CO 3: Give information various approaches to studying and doing research in literature

CO 4: Will guide the students to do ethical and original research

UNIT I: INTRODUCTION

What is Research? Meaning, Objectives and Motivation

Basic types of research – Basic, Applied, Qualitative, Quantitative

Steps of Research:

- Identifying a Research Problem/Research Gap
- Literature Review
- Setting and Fixing of Hypotheses
- Methodology / Finalising the Primary Sources
- Collection of secondary sources/data/materials – libraries, websites, questionnaire
- Analysis &Interpretation
- Findings & conclusions

UNIT II: STRUCTURAL LAYOUT OF THE THESIS

- Difference between a thesis/dissertation/research papers
- Writing the thesis – Research Language – The Thesis Statement
- How to draft a research proposal
- Parts of thesis – abstract, contents, survey of literature, chapters
- Spelling and punctuation/capitalization, underlining and italics
- Footnotes and endnotes/ Appendix/tables/pictures
- Preparing Works Cited

UNIT IIIRESEARCH ETHICS AND IPR **15 Hours**

- Ethics – meaning and definition - Rights and obligations of Research Participants
- Falsification, fabrication, plagiarism and Self plagiarism
- Publication ethics - Types of publication misconduct- Redundant publications – duplicate and overlapping publications, salami slicing
- Predatory journals and the relevant case studies
- Origin, development, nature and characteristics of IPR
- Forms of IPR
- Filing and Registration process of IPRs

UNIT IV RESEARCH AND PUBLICATION **15 Hours**

- Scholarly/research article – meaning and features of scholarly article.
- Successful scientific writing – process
- Referencing Journal data bases
- Data bases– indexing data base, citation data base, Web of science, Scopus, so on
- Research Metrics – Impact Factor of Journal as per Journal Citation Report
- Practical hands on experience in writing a research paper for a Humanities subject

REFERENCES:

1. Correa, Delia Sousa Da and W.R. Owens: *The Handbook to Literary Research*
2. Gabrielle, Griffin ed. *Research Methods for English*
3. Kothari , C.R. *Research Methodology: Methods and Techniques*
4. *MLA Handbook* – 8th Edition
5. Modem Rhetoric - Brooks and Warren.
6. New Delhi. Sinha, M.P. *Research Methods in English*
7. Paul Oliver. Writing your Thesis.
8. Thesis and Assignment Writing– Anderson, Durston and Poole.
9. Thesis Writing (Prentice Hall) - Iverson
10. Thesis Writing. - C.J. Parsons
11. Thorpe, James. Ed. The Aims and Methods of Scholarship in Modern Languages and Literatures, New York, PMLA

MA ECONOMICS

PS 115.2 RESEARCH METHODOLOGY AND ETHICS (50 hours)

Objectives:

- Generate the capacity of critical thinking and engage the students in the process of research itself.
- Enable the students to conceptualize a research problem and develop a number of complementary designs, measurement, and data collection approaches to bring evidence to bear on the problem.
- Capacitate the student to prepare a research proposal, and evaluate the quality of evidence in published research.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications

Learning Outcomes:

- ✓ Students can develop testable hypotheses, differentiate research design and/or statistics, evaluate aptness of research conclusions, and generalize them appropriately.
- ✓ Students can design and conduct quantitative or qualitative research studies in laboratory or field settings. Students use research data to formulate or evaluate new research questions, using reason and persuasion in a logical argument.
- ✓ Students can summarize and evaluate a body of research including primary literature, and can compare psychology's methods with other disciplines' methods.
- ✓ Demonstrate a logical argument, analyse and interpret data and evaluate alternative perspectives on the basis of objective reasoning. Communicate and present complex arguments in oral and written form with clarity and succinctness.
- ✓ Able to write original research articles following ethical guidelines and practices in conducting the research and publication of papers.
- ✓ More awareness on Intellectual property Rights and Patents.

MODULE I: INTRODUCTION (10 hours)

The Meaning, Definition, Nature and Need of 'Research' –Types of Research- Objectives- Research in Social Sciences and Natural Sciences – Objectivity in Research – Research Philosophy-Deductive and Inductive Reasoning - Scientific method - Basic Categories in

Scientific Method – Facts – Concepts – Construct - Theory. Research Process and Strategies.

MODULE II: RESEARCH PROCESS (15 hours)

Formulation of Research Design - Research problem and Formulation– Role of Review of Literature– Hypothesis; Concept, Definition, Formulation, Concepts in testing of Hypothesis. Sampling - Various Sampling Methods – Importance of Proper Sampling Design. Primary Data Collection - Tools – Observation, Interview, Schedule and Questionnaire – Questionnaire - Design, Structure, Types of questions - Reliability and validity of data. Secondary Data- Sources of Secondary Data- Collection of Secondary Data. – Qualitative Research – Methods – Case Study.

MODULE III: INTERPRETATION AND REPORT WRITING (10 hours)

Processing and Analysis of Data. Interpretation – Meaning, Importance and Techniques. Reporting Writing – Structure and General Format – Style – Use of Footnotes – Citations – Presentation of Tables, Diagrams, Charts and Maps – Bibliography. Introduction to hypothesis testing statistical packages.

MODULE IV: RESEARCH ETHICS, IPR AND PUBLICATION (15hours)

Ethics – meaning and definition- Ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics, misconduct – Violation of public ethics. Predatory publishers and journals. IPR – concept, nature and characteristics, origin and development, forms. IPR issues in Social Sciences. Publication of scholarly/research article – meaning and features of scholarly article. Data base and Research – Data bases – indexing data base, citation data base, Web of science, Scopus etc, Research Metrics – Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics – h-index, g-index, i10 index, Altmetric.

REFERENCE

1. Anderson, R., &Braud, W. (2011). Transforming self and others through research: Transpersonal research methods and skills for the human sciences and humanities. Albany, NY: State University of New York Press.
2. Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
3. Booth, A., Papaioannou, D., & Sutton, A. (2012). Systematic approaches to a successful literature review. Los Angeles, CA: Sage.
4. C R Kothari, Gaurav Garg (2019). Research Methodology: Methods and Techniques, New Age International.

5. David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
6. Deepak C &Neena S (2018). Research Methodology, Concepts and Cases, Vikas Publishing House, New Delhi.
7. Goode, W.J. (1981). Methods in Social Research. New and Hatt, P.K.York McGraw-Hill Company.
8. Howard Lune, Bruce L. Berg (2016). Qualitative Research Methods for the Social Sciences, Pearson; 9th edition.
9. Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
10. Ivankova N. V. (2015). Mixed methods applications in action research: From methods to community action. Thousand Oaks, CA: Sage.
11. Jayashree Watal. (2013): Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
12. Krishnaswamy O. R. (1993), Methodology of Research in Social Sciences, Himalaya Publishing, Mumbai.
13. Leedy P D. (2015): Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
14. McMillan, V.E. (2012). Writing papers in the biological sciences (5th ed.). Boston.
15. O'Leary Z. (2014). The Essential Guide to Doing Your Research Project, Los Angeles, CA: Sage.
16. Pan, M. L. & Lopez, M. (2013). Preparing literature reviews: Qualitative and quantitative approaches (4th ed.), Glendale, CA: Pyrczak Pub.
17. Ranjit Kumar (2014). Research Methodology: A step by step Guide for Beginners, 4t h Edition, Sage Publications.
18. Ranjit Kumar (2014). Research Methodology: A step by step Guide for Beginners, 4t h Edition, Sage Publications.
19. Singh. A K. (2017): Tests, Measurements and Research Methods in Behavioral Sciences. Bharathi Bhawan Publishers & Distributors, New Delhi
20. Valsiner, J, Molenaar, P.C.M.; Lyra, M.C.D.P.; Chaudhary, (2014). Dynamic Process Methodology in the Social and Developmental Sciences, Springer-Verlag New York Inc.
21. Wallinman N. (2005):Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London

MA Journalism and Mass Communication

Course Code: PH 101.2

COMMUNICATION RESEARCH METHODS

(Total Credits:5)

Programme Outcome

To prepare men and women for others, having a deep concern for society and environment, who contribute towards journalistic and media activity, in building the nationwith ethical sense and responsibility.

Programme Specific Outcome

1. Inculcate a vigour and proper research methods and related subjects in Media studies at masters programme
2. To answer competitive exams effectively and pursue higher studies and research
3. To inculcate holistic knowledge of both theory ad practical components related to audio-visual media and journalism.

Course Outcome

1. To learn about different types of research methods
2. To learn some of the statistical tools employed while conducting research
3. To prepare a research proposal at the end of the course
4. To make research an enjoyable task and a multidisciplinary exercise

Unit.1 Introduction to Research (14 Hours)

Meaning of research, Objectives, Types of research: applied, basic; Process of research, Hypothesis, Statement of the problem, Qualities of a researcher, Research proposal

Unit. 2 Process of Research (10 Hours)

Research designs, Needs for a research design, Independent and dependent variables, Sampling procedures and types of sampling, Validity and reliability, Levels of measurement

Unit.3 Types of research (10 Hours)

Application of various types of research into mass communication: Experimental, Survey research, Content analysis, Historical research

Unit.4 Methods and tools of data collection (13 Hours)

Qualitative research methods, Semiotic Analysis; Quantitative research methods, Tools: questionnaire, interview, observation, and Focus Group Discussion (FGD)

Unit.5 Data Analysis and Interpretation (13 Hours)

Use of statistics in research analysis, Statistical tools for media research- frequency distributions, graphic representation, Measures of central tendency, Application of statistical tests- Chi-square, Co relation, ANOVA, Coding and tabulation; References; Bibliography – APA, MLA styles Assessment Semester Exam: 70 marks Internal Assessment: 30 marks

REFERENCES/ SUGGESTED READINGS:

Key Text: Roger D Wimmer& Joseph R Dominick, *Mass Media Research – An Introduction. 9thEd.*

Arthur Asa Berger: *Media Research Techniques*– Sage Publications, 1991.

Klaus KrippenDorff: Content Analysis :*An Introduction To Its Methodology*– Sage. 1980.

Susanna HornigPreist,*Doing Media Research: An Introduction*– Sage. 1995.

James H Watt; Sjeg A VandenBerAllyn and Bacon,*Research Methods for Communication Science*- 1995.

Anders Hansen; Others: Mass Communication Research Methods- Macmillan 1998.

David Dooley: Social Research Methods – Prentice Hall Of Ind 1997.

Shearon A Lowery, Melvin D Fleur, *Milestones In Mass Communication Research – Media Effects.* Longman Publishers U. 1994.

Emily Stier Adler & Roger Clark,*How It's Done: An Invitation to Social Research, 3rdEd*

Earl R. Babbie, *The Basics of Social Research.4thEd.*

KarlynKohrs Campbell & Susan Schultz Huxman, *The Rhetorical Act: Thinking, Speaking and Writing Critically. 4thEd*.

Earl R Babbie. The Practice of Social Research.11$^{\text{th}}$Ed.

Earl R Babbie. The Basics of Social Research.3$^{\text{rd}}$Ed.

Leslie A Baxter, Earl R Babbie.The Bascis of Communication Research.

Frederick Williams, Peter R Monge,*Reasoning With Statistics: How to Read Quantitative Research. 5thEd.*

MSW

Paper: PH 202.2: SOCIAL WORK RESEARCH AND STATISTICS

Total Hours: 50

Course Outcomes:

By the end of the course the student will be able to:

- Acquire knowledge of the scientific method of inquiry for the study of social phenomena
- Develop an understanding of the Research process and basic Research skills
- Demonstrate an understanding into the different methods of data collection and sampling.
- Enabled to apply statistical measures in Social Work Research.

Course Content:

UNIT I: Introduction to Research: **No. of Hours** : **08**

Scientific Research: Concept and application of Scientific method for the study of social phenomenon

Social Work Research: Meaning, Objectives and Scope of Social Work Research

Steps in Research Process

Ethical conduct in Research

UNIT II: Research Elements, Approaches and Methodology: **No. of Hours :12**

Formulation of Research Problem – Research Question

Review of literature, Concepts, Variable

Hypothesis: Meaning and Types

Research approaches: Quantitative and Qualitative

Research Designs: Descriptive, Exploratory, Diagnostic, Experimental, Formative research and Action Research

Sampling: Meaning, Types: Probability Sampling Types – Simple Random, Systemic Random, Stratified Random, Cluster sampling and Multistage sampling

Non-probability –Convenience, Purposive (Judgmental), Quota and Snowball sampling

UNIT III: Data Collection, Analysis, Reporting and Research Ethics:

No. of Hours:**11**

Methods of Data Collection: Quantitative methods- Questionnaire and Interview Schedules

Qualitative methods – Observation, In-depth Interviews, Focus group discussion and Case study method

Formulation of Research Proposal

Data Processing, Data analysis and Interpretation, Report writing Plagiarism in Research

Intellectual Property Rights – Meaning and its significance in Research

Writing Research Paper /Article

UNIT IV: **Computation of Descriptive Statistics: No. of Hours:10**

Definition, Meaning and Application of Statistics; Use of Statistics for Social Workers

Measures of Central Tendency: Definition and Computation of Arithmetic Mean, Median and Mode

Measures of Dispersion: Definition and Computation of Range, Quartile Deviation and Standard Deviation

UNIT V: Computation of Inferential Statistical Tests: No.ofHours:09

Correlation: Karl Pearson's co-relation Co-efficient and Spearman's Rank Co-relation

Measures of Significance: Student's 't' Test and Chi Square Test

Use of Statistical Package for the Social Sciences (SPSS) in Social Work research

Computer assisted Data Analysis (Practical Classes)

REFERENCES:

- Alston, Margaret; Bowles, Wendy, (2012). *Research for Social Workers*, New Delhi: Psychology Press
- Cauvery, R, (2003). *Research Methodology*, New Delhi: S Chand and Company Ltd
- Das, D.K, Lal, (2005). *Designs of Social Research*, New Delhi: Rawat Publications
- Das, D. K, Lal, (2000). *Practice of Social Research*, New Delhi: Rawat Publications
- Gupta Santosh, (2010). *Research Methodology and Statistical Techniques*, New Delhi: Deep and Deep Publications
- Kapoor, D, R, and Saigal, Puja, (2013). *Research Methodology-Methods and Techniques*, New Delhi: Regal Publications
- Kothari, C, R, (2006).*Research Methodology- Methods and Techniques*, New Delhi: VishwaPraskashan
- Kumar, Raj. (2002). *Methodology for Social Science Research*, Jaipur: Book Enclave
- O'Leary, Zina. (2005). *The Essential Guide to Doing Research*, New Delhi: Vistar Publications
- Patnaik, Asit Kumar. (2011). *Research Methodology in Social Science*, New Delhi: Commonwealth Publishers
- Ranganathan, m.; Krishnaswami. (2019). *Methodology of Research in Social Sciences*, New Delhi: Himalaya Publishing House Pvt Limited
- Rathod, P.B. (2005.) *Dimensions of Social Research*, New Delhi: Common Wealth Publishers
- Shelley Anand, (2018). *Research Methods and Techniques in Social Science*, New Delhi: Arjun Publishing House

M.Com

PS 315.2 Research Methodology and Ethics

Objectives of the Paper:

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- To know how to write research papers and publish research papers.

Learning Outcomes:

On successful completion of this course, students will be able to:

- Identify research output with philosophical base and greater relevance to the society
- Undertake quality research with scientific methodology
- Produce good Research Reports
- Undertake original Research following ethical guidelines and practices in conducting the research and publication of papers.

Pedagogy: Class room lecture, laboratory experiments, seminars, assignments, case studies, field survey, projects, workshops, dissecting research papers.

Unit 1: Foundation of Research: (8 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Research as a Scientific Method, Types of Research; Assumptions- Ontology, Epistemology, Axiology; Philosophy – positivism, critical realism, interpretivism, post modernism, pragmatism – meaning, relevance and assumptions; Concept of Theory and Theory Building – deduction, induction and abduction.

Unit 2: : Research Process (10Hours)

Research Problem – meaning, Selection and Definition of Problem, Identifying Research Problem, Formulating Research problem; Review of Literature – meaning and need for literature review, sources of literature review, Organising and presenting Literature Review, identification of research gap; Variables – meaning, types of variables; Research Design – meaning, features of good research design, different types of research design- observational research design-descriptive, analytical, exploratory research design, and experimental research design., Objectives of the study; Research Hypotheses – meaning and kinds of hypotheses, Procedure of Hypothesis Testing; Scope of the study.

Unit 3: Sampling and Data Collection (10 Hours)

Sampling and Sample Design – Steps involved in developing sampling design, Sampling and Non-sampling errors; characteristics of a good sampling design, Sampling techniques – Different types of probability sampling- simple random sampling, systematic sampling, stratified sampling, cluster and multistage sampling, different types of non-probability sampling- purposive, convenience, quota sampling techniques; advantages and disadvantages of various methods; Census versus Sample Survey. Data Collection – meaning, Selecting an appropriate method of Data collection, Types- primary data- Observation method, Interview method, Questionnaire method, Schedule method, secondary data- Sources of Secondary Data; Phases of Designing a questionnaire**.**

Unit 4: Analysis and interpretation of the data and Report writing (9 hours)

Measurements in research-nominal, ordinal, interval, ratio; Analysis and interpretation of Data

– meaning and importance, precautions in interpretation, Thesis writing /Report writing

- Planning and organizing research report, format of research report, significance of report writing, different steps in writing reports, layout of the research report, mechanics of writing research report, precautions for writing research reports, format of reference writing and bibliography writing.

Unit 5: Research Ethics and Publication **(8 hours)**

Ethics – meaning and definition, Rights and obligations of Research Participants. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest. Publication misconduct – meaning, types of publication misconduct, complaints and appeal. Publication – Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and how to avoid it.

References (latest editions):

- Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
- Cooper R Donald, Schindler S Pamela. Business Research Methods, Tata McGraw Hill Publications Ltd, New Delhi
- Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
- Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
- Ramamurthy G C, Research Methodology. Dreamtech Press, New Delhi.
- Singh Y K. Fundamentals of Research Methodology and Statistics. New International
  (P) Ltd., New Delhi.
- Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London

M.Com (Finance and Analytics)

PS 355.2 Research Methodology and Ethics

Objectives of the Paper:

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.

Outcome of the Paper:

- Research output with philosophical base and greater relevance to the society
- Quality research with scientific methodology
- Production of good Research Reports
- Original Research following ethical guidelines and practices in conducting the research and publication of papers.
- More awareness on Intellectual property Rights and Patents.

Pedagogy: Classroom lecture, laboratory experiments, seminars, assignments, case studies, field survey, projects, workshops, dissecting research papers.

Unit 1: Foundation of Research:(6 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research; Philosophy and Research Philosophy – Ontology, Epistemology, Axiology, positivism, critical realism, interpretivism, post modernism, pragmatism – meaning, relevance and assumptions. Concept of Theory and Theory Building–deduction, induction and abduction. Research Strategies - meaning and types.

Unit 2: Research Methodology (13 Hours)

Research Problem – meaning, selecting the problem, sources of problem, statement of a problem; Review of Literature – meaning and need for literature review, sources of literature review, reporting the review of literature, identification of research gap; Variables – meaning, types of variables and selection of variables; Research Design – meaning, features of good research design, types of research design, significance and preparation of research design; Research Questions; Objectives of the study; Research Hypotheses – meaning and importance kinds of hypotheses, formulating hypotheses, testing the hypothesis; Scope of the study; Sampling and Sample Design – population, sample, sample unit and sampling, requisites of sampling, types of sampling and size of sample; Data Collection – meaning, sources of data, primary data, secondary data, preparation of questionnaire/experimental design. Reliability and Validity in Research.

Unit 3: Interpretation and Report Writing; (Subject Specific)(6 Hours)

Analysis of Data – tabulation, choosing appropriate statistical tests, interpretation and testing of hypotheses. Research Report – meaning, features of a good Research Report, elements ofResearch Report, format of a Research Report, Appendices and References/ Bibliography –styles.

Unit 4: Research Ethics: (10 Hours)

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct –meaning, problems that lead to unethical behaviors, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Violation of public ethics, authorship and contributorship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions etc,. Selective reporting and misinterpretation of data. Best practices/standard setting initiatives and guidelines. Self-plagiarism.

Unit 5: Intellectual Property Rights (IPR) and Publication of Scholarly Papers:

(10 Hours)

IPR – Concept of IPR, nature and characteristics of IPR, origin and development of IPR, justification and rationale for protecting IPR, IPR and sustainable development, IPR and human rights, IPR issues in physical and biological sciences, Commerce and IPR issues**,** IPR issues in Social Sciences. Forms of IPR – copyrights, trademarks, patents, industrial designs, trade secrets, geographical indications – meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

Publication –Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and how to avoid it. Dissecting research papers.Data base and Research – Data bases – indexing data base, citation data base, Web of science, Scopus etc, Research Metrics – Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics – h-index, g-index, i10 index, Altmetric.

References

- Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
- Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
- David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
- Jayashree Watal. Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
- A K Singh. Tests, Measurements and Research Methods in Behavioral Sciences. Bharathi Bhawan (Publishers & Distributors), New Delhi
- Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
- Singh Y K. Fundamentals of Research Methodology and Statistics. New International (P) Ltd., New Delhi.

- Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London
- Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
- Kothari C.R. (2013). Research Methodology: Methods and Technique, 3/e, new age international publishers.
- Neena Sodhi, Deepak Chawla (2011), Research Methodology Concepts & Cases, 1/e, Vikas Publishing House Pvt. Ltd.
- Donald R. Cooper, Pamela S. Schindler, (2016), Business Research Methods, 9/e, Tata McGraw-Hill Co. Ltd,.
- William G. Zikmund, Barry J. Babin, Jon C. Carr, and Mitch Griffin, (2016), Business Research Method, 8/e, Cengage Learning.
- Srivastava T. N and Shailaja Rego (2011), Business Research Methodology, Tata McGraw Hill.

M.Sc Biochemistry

PS.514.2 RESEARCH METHODOLOGY AND ETHICS

Total No. of Lectures: 42 hours **Total marks: 70**

No. of Lectures/week: 3 **Credits : 3**

Course Objective:

The primary objective of this course is to acquaint students with fundamentals of research methods, introducing them to the basic concepts used in research. It includes discussions on sampling techniques, research designs and techniques of analysis.

This paper gives the students training in soft skills required to analyse and interpret their research findings. The first unit is devoted to research methodology, clear understanding of the meaning and purpose of research in academics, research philosophy and strategies of research. Second unit is devoted to biostatistics, various tests and parameters for data analysis. Third unit deals with understanding the ethical issues and practices in research with an awareness of rights and obligations of research participants and also to understand the process of intellectual property rights and its different forms and implications.

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Course Learning Outcomes: Upon completion of this course, students will be able to

CO 1: Demonstrate an understanding of research design, procedures of sampling, data collection, analysis and reporting.

CO 2: Describe the appropriate statistical methods required for a particular research design and apply appropriate statistical methods for analyzing one or two variables..

CO 3: Display an understanding of imperative issues in research ethics, like responsibility for research, scientific misconduct and ethical evaluation

CO 4: Demonstrate awareness on Intellectual property rights and patents

Unit-I **12L**

Research methodology:

Meaning and importance of Research – Types of Research – Selection and formulation of Research Problem – Research Design.Types, Methods & Classification of Research.

Sampling techniques- population & sample, types of samples and sampling techniques.

Data Collection: Objective and Classification of Data, Types of data: Primary, Secondary and Tertiary Data. Graphical representation of data- line graph, histogram, pie chart, exponential growth, Scaling technique.

Design of experiment- Completely randomized design, randomized block design.

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.

Unit –II **20L**

Biostatistics –Frequency distribution and frequency polygon. Graphic representation – Line graph, histogram, pie chart. Measures of central tendency- mean, median, mode, quartiles and percentiles. Measures of dispersion; variance, standard deviation, standard error, measures of skewness and kurtosis.

Probability and distributions: sample space, events. Definition of probability (frequency approach), independent events.Addition and multiplication rules, conditional probability.Examples- Binomial, poisson and normal distributions.

Tests of significance: Sample test (chi square, t-test, F –test), large sample test(z test), p value of the statistics, ANOVA- one way and two way.

Bivariate data: scatter plot, correlation coefficient - positive and negative correlation, regression coefficient.

Unit III **10L**

Research Ethics:

Ethics – meaning and definition, Ethics versus moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants.Scientific conduct – ethics with respect to science and research, intellectual honesty and research

integrity. Scientific misconduct – falsification, fabrication and plagiarism , Self-plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct – meaning, problems that lead to unethical behaviors, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Citation index. H-index, i-index,

Violation of public ethics, authorship and contributor ship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions, UGC care list, Scopus, Web of Science. Selective reporting and misinterpretation of data. Best practices/standard setting initiatives and guidelines.

Intellectual property rights: Different types of intellectual property rights, patents-national and international patents. Patenting procedures, patent applications & rules governing patenting.Patenting of genes and products.Ethical and moral issues in biological and biotechnological research**.**

References:

1. Kumar, R. (2018). Research methodology: A step-by-step guide for beginners. Sage..
2. Holmes, D., Moody, P., Dine, D., &Trueman, L. (2017). Research methods for the biosciences. Oxford university press..
3. Kothari, C. (2017). research methodology methods and techniques by CR Kothari. Published by New Age International (P) Ltd., Publishers, 91..
4. Hoel, P. G. (1960). Elementary statistics. Elementary statistics..
5. Khan, I. A., &Khanum, A. (2004). Fundamentals of biostatistics. Ukaaz..
6. Rao, P. S., & Richard, J. (2012). Introduction to biostatistics and research methods. PHI Learning Pvt.Ltd..
7. Indrayan, A., &Satyanarayana, L. (2006). Biostatistics for medical, nursing and pharmacy students. PHI Learning Pvt. Ltd.
8. Dutfield, G. (2009). Intellectual property rights and the life science industries: past, present and future. World Scientific.
9. Palfrey, J. (2011). Intellectual property strategy. Mit Press.

M.SC BIOTECHNOLOGY

PS 505.2 RESEARCH METHODOLOGY, ETHICS AND SCIENTIFIC COMMUNICATION 42 Hours

Course Objectives:

This course enables the students to:

- Understand the purpose of research in academics
- Understand the methodologies used to do research
- Understand scientific communication
- Appreciate scientific ethics

Student Learning Outcomes:

At the end of the course, a student should be able to:

- Explain the differences between research methodologies
- Design a small research project with appropriate research method
- Apply correct ways of referencing to and citing from scientific literature
- Analyze, contrast, compare and criticize scientific literature
- Write a research report/ thesis

Unit I (14 Hours)

Foundations of research and research ethics:

History of science and science methodologies: Empirical science; scientific method; manipulative experiments and controls; deductive and inductive reasoning; descriptive science; reductionist *vs*holistic biology. Preparation for researchChoosing a mentor, lab and research question; maintaining a lab notebook.

Concepts of research: Definition of research, the need for research.Types of research - purpose driven and method based. Classification of Purpose driven research: Basic and Applied research. Classification of method-based research: historical, descriptive correlation, ex-post facto, experimental, case survey and content analysis.

Rights and obligations of Research Participants.Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity.Scientific misconduct – falsification, fabrication and plagiarism.Software for detecting plagiarism.Publication ethics – meaning and importance, conflicts of interest,

publication misconduct –types of publication misconduct, identification of publication misconduct, complaints and appeal.

Unit II **(14 Hours)**

Research methodology. Selecting and defining a research problem: Criteria for selecting a problem, formulating and testing the hypothesis. Literature review: web browsing for information search; search engines; hidden Web and its importance in scientific research

Research design – Experimental and Nonexperimental research design, Field research, and Survey research.Methods of data collection – Secondary data collection methods, qualitative methods of data collection, and Survey methods of data collection.Attitude measurement and scaling – Types of measurement scales; Questionnaire designing – Reliability and Validity.Sampling techniques – The nature of sampling, Probability sampling design, Nonprobability sampling design, Determination of sample size.Processing and analysis of data, applying computer software for statistical calculations and interpreting results and drawing conclusions.Representation of data.

Unit III **(14 Hours)**

Scientific communication - scientific writing skills - importance of communicating science;

Types of reports- research reports/ thesis. Elements of a scientific paper including abstract, introduction, materials & methods, results-presentation of data: tables/figures, tests of statistical significance, discussion, references; styles for citing references, Mendeley software, drafting titles; Guidelines on Authorship, Copy right form.

Publishing scientific papers – journal finder, Data bases – indexing data base, citation data base, Web of science, Scopus etc, Research Metrics – Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics – h-index, g-index, i10 index, Altmetric. Formatting the paper as per instructions of the journal, submission, peer review process, open access. Predatory publishers and journals – software to identify predatory publications.

Scientific presentations-scientific poster preparation & presentation; PowerPoint presentation and defending interrogation.Writing research grant proposals.

REFERENCES:

1. Hochberg, M. (2019). An Editor's Guide to Writing and Publishing Science, Oxford University Press.
2. Johnson, S., & Scott, J., (2019). Study and Communication Skills for the Biosciences, 3rdedn., Oxford University Press.
3. Jupp, V., &Sapsford, R., (2008). Data Collection and Analysis, 2ndedn.,SAGE Publications Inc.
4. Kothari, S. R., (2012). Research Methodology Methods and Techniques, New Age International (P) Ltd., Publishers.
5. Matthews, J.R. (2021). Successful Scientific Writing (A Step-by-Step Guide for the Biological and Medical Sciences), 4th edn., Cambridge University Press.
6. Muralidhar, K., &Ghosh, A., (Eds) (2019). ETHICS in Science Education, Research and Governance. Indian National Science Academy (INSA).
7. Prathapan, K. (2019). Research Methodology for Scientific Research, Wiley.
8. Ruxton, J. D., &Colegrave, N., (2016). Experimental Design for the Life Sciences, 4th edn.,Oxford University Press.
9. Sharma, M. (2011). Research Methodology and Scientific Communication, VDM Verlag.
10. Wayne, C. B., Colomb, G.C., & Williams, J.M., (2008). The Craft of Research, 3rd edn., The University of Chicago Press.

M.Sc Food Science and Technology
M.Sc Food Science Nutrition and Dietetics

PS 596.2 & PS 815.2 Research Methodology and Ethics

39Hours

Course Objectives:

- To understand the scientific approaches to research
- To understand the significance of research methods in food science
- To appreciate the importance of scientific writings and develop competence in writing skill
- To draft a research proposal and write a scientific paper

Unit I

Research: Types, objectives, research approaches, research and scientific methods, criterions of good research. Research Problem: Definition and techniques involve in defining a problem. Research Designs: Meaning, need for research design, features and types. Experimental Design: Basic principles of experimental design, selection of experimental material, Essential Constituents of Literature Review.

Unit II

Sampling: Need for sampling, unit, population and sample, sampling methods, Important Sampling Distributions, Central Limit Theorem and Sampling Theory. Sampling design:Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design. Data: Collection of Primary Data and Secondary Data. Classification and summarization of data. Presentation of Data - Diagrams and Graphs.

Unit III

Introduction to statistics: Measures of Central Tendency (Mean, Mode and Median); Measures of Central Dispersion (Range, Standard Deviation, Standard Error, Coefficient of Variation); Correlation-Regression-Simple, Multiple (three Variables).Tests of Significance –'t' Test (One Sample and Two Sample Tests), Hypothesis Testing, Level of Significance and Confidence Interval, Analysis of Variation (ANOVA). Multiple comparison test

(DMRT), Chi square test for goodness of fit. Probability distributions. Application of computer in research: Basic principles of Statistical Computation using various softwares; design of experiments and analysis of results using various software (SPSS Statistics, Design Expert, etc)

Unit IV

Scientific/technical writing and research presentation: Types, Structure and components of Scientific Reports; Technical Reports and Thesis; Steps in the preparation of reports and thesis layout, structure and language of typical reports, illustrations and tables, bibliography, referencing and foot notes. Citation, Impact factor, h-index and Acknowledgement. **Ethics in research:** Responsible conduct; the regulations and ethics of animal use in research; Research ethics for human subjects; Role of ethics committees in biological research; **Intellectual Property Rights (IPR):** patenting of process and products; reproduction of published material; plagiarism.

Broad contents of the course:

1. Overview of Research:
2. Scientific Thinking
3. Elements of Research
4. Quantitative Research Methods
5. Qualitative Research Methods
6. Presentation of Research
7. Ethics in research
8. Intellectual Property Rights (IPR)

Course learning outcome:

- Demonstrate knowledge of research processes (reading, evaluating, and developing)
- Perform literature reviews using print and online databases
- Define and develop a possible hied research interest area using specific research designs
- Compare and contrast quantitative and qualitative research paradigms, and explain the use of each in research

- Describe sampling methods, measurement scales and instruments, and appropriate uses of each
- Explain the rationale for research ethics, and the importance of IPR

Recommended Books:

1. Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research,Himalaya Publishing House, Mumbai.
2. Copper, H.M. (2002). Intergrating research: A guide for literature reviews (2nd Edition). California: Sage Harman, E & Montages, I. (Eds.) (2007). The thesis and the book, New Delhi: Vistar.
3. Mukherjee, R. (1989): The Quality of Life: Valuation in School Research, Sage Publications, New Delhi.
4. Stranss, A and Corbin, J. (1990): Basis of Qualitative Research: Grounded Theory Procedures and Techniques, Sage Publications, California
5. Montgomery, D. C., (2001). Design and Analysis of experiments, Fifth Edition, John Wiley & Sons.
6. Kothari, C.R.(2008). Research Methodology: Methods and Techniques. Second Edition. New Age International Publishers, New Delhi
7. Vining, G. G., Kowalski, S. (2010). Statistical Methods for Engineers.2nd Edn. Cengage Learning (RS), Boston, USA.

M.Sc ANALYTICAL CHEMISTRY & M.Sc CHEMISTRY

PS 546.1 RESEARCH METHODOLY

Course Outcome

Student will be able to:

- **Evaluate Research output with philosophical base and greater relevance to the society**
- **Identify the parameters of Quality research with scientific methodology**
- **Understand the concepts Original Research, ethical guidelines and practices in conducting the research and publication of papers.**
- **Create awareness on Intellectual property Rights and Patents.**

Unit 1: Foundation of Researchand Research Methodology: 14 Hours

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research; Philosophy and Research Philosophy – Ontology, Epistemology, Axiology, positivism, critical realism, interpretivism, post modernism, pragmatism – meaning, relevance and assumptions. Concept of Theory and Theory Building – deduction, induction and abduction. Research Strategies - meaning and types.

Research Problem – meaning, selecting the problem, sources of problem, statement of a problem;

Review of Literature – meaning and need for literature review, sources of literature review, reporting the review of literature, identification of research gap; Print : Sources of information – Primary, Secondary, Tertiary sources – Journals – Journal abbreviations – Abstracts – Current titles – Reviews – Monographs – Dictionaries – Textbooks – Current contents – Introduction to Chemical Abstracts and Beilstein – Subject Index, Substance Index, Author Index, Formula Index and other Indices with examples. Digital : Web resources – E–Journal – Journal access – TOC alerts – Hot articles – Citation index – Impact factor – H–Index – E–Consortium – UGC infonet – E–Books – Internet discussion groups and communities – Blogs – Preprint server – Search engines, Scirus, Google Scholar, ChemIndustry, Wiki – Databases, ChemSpider, ScienceDirect, SciFinder, Scopus.

Unit 2 :Chemical Safety and Ethical Handling of Chemicals 14 hours

Safe working procedure and protective environment, protective apparel, emergency procedure and first aid, laboratory ventilation, Safe storage and use of hazardous chemicals, procedure for working with substances that pose hazards, flammable or

explosive hazards, procedures for working with gases at above or below atmospheric pressures – safe storage and disposal of waste chemicals , recovery , recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives , identification , verification and segregation of laboratory waste , disposal of chemicals in the sanitary sewage system , incineration and transportation of hazardous chemicals .

Unit 3: Research Ethics and Intellectual Property Rights (IPR): (14 Hours)

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, plagiarism and Self-plagiarism

IPR – Concept of IPR, nature and characteristics of IPR, origin and development of IPR, justification and rationale for protecting IPR, IPR and sustainable development, IPR and human rights,. Forms of IPR – copyrights, trademarks, patents, industrial designs, trade secrets, geographical indications – meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

References:

1. Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
2. Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
3. David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
4. Jayashree Watal. Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
5. A K Singh. Tests, Measurements and Research Methods in Behavioral Sciences. Bharathi Bhawan (Publishers & Distributors), New Delhi
6. Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
7. Singh Y K. Fundamentals of Research Methodology and Statistics. New International (P) Ltd., New Delhi.
8. Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London
10. Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
11. Chemical safety matters–IUPAC –IPCS, Cambridge Univ. Press, 1992

M.Sc Mathematics

PS 562.2 Research Methodology and Ethics

Objectives of the Paper:

- To have clear understanding of the meaning and purpose of Research in academics and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.

Outcome of the Paper:

- Quality research with scientific methodology
- Production of good Research Reports
- Original Research following ethical guidelines and practices in conducting the research and publication of papers.
- More awareness on Intellectual property Rights and Patents.

Unit 1: Foundation of Researchand Research Methodology:(20 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research,Concept of Theory and Theory Building,

Research Problem – meaning, selecting the problem, sources of problem, statement of a problem; Review of Literature, sources of literature review, identification of research gap; Research Questions; Objectives of the study , Research Report – meaning, features and format, Appendices and References/ Bibliography –styles

Unit 2: Mathematical Writing: (18 Hours)

Essential rules of grammar, syntax and usage in mathematical writing; more specifics on writing a definition, theorem, writing proofs; mathematical research –meaning and objectives, writing a paper, collaborative work; usage of a Text Editor

Unit 3:Research Ethics, Intellectual Property Rights (IPR) and Publication of Scholarly Papers(10 Hours)

Ethics – meaning and definition, Scientific conduct – ethics with respect to science and research, scientific misconduct – falsification, fabrication and plagiarism. Publication ethics, publication misconduct, Violation of public ethics, authorship and contributorship, Predatory publishers and journals, Self-plagiarism

IPR – Concept of IPR, nature and characteristics of IPR, origin and development of IPR, Forms of IPR – copyrights, trademarks, patents, Publication – Scholarly/research article – meaning and features of scholarly article, Data base and Research – Data bases, Research Metrics

References:

- Kothari C R - Research methodology: Methods & Techniques. New Age International Publishers, New Delhi, 2nd edition, 2014
- Walliman N - Your Research Project: A Step by Step Guide for the first time Researcher, Sage Publications, London, 2005
- Steven G Krantz - A Primer of Mathematical Writing. American Mathematical Society, 2nd edition,2016
- Ethics in Science Education, Research & Governance, Indian National Science Academy (INSA), 2019
- David I Bainbridge - Intellectual Property, Pearson, 10th edition, 2018
- JayashreeWatal - Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press, 2003

M.Sc. Physics

PS 574.2 Research Methodology and Ethics

Course Learning Outcomes

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.

Unit 1: Foundation of Research and Research Ethics [13 Hours]

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research; Philosophy and Research Philosophy. Concept of Theory and Theory Building – deduction, induction and abduction. Research Strategies - meaning and types.

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct – meaning, problems that lead to unethical behaviours, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Violation of public ethics, authorship and contributorship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions etc. Selective reporting and

misinterpretation of data. Best practices/standard setting initiatives and guidelines. Self-plagiarism.

Unit 2: Research Methodology and Interpretation and Report Writing [13 Hours]

Research Problem – meaning, selecting the problem, sources of problem, statement of a problem; Review of Literature – meaning and need for literature review, sources of literature review, reporting the review of literature, identification of research gap; Research Questions; Objectives of the study.

Research Report – meaning, features of a good Research Report, elements and format of a Research Report, Appendices and References/ Bibliography – styles.

Research design, system of interest- experimental setup-characterization-data acquisition-data analysis-reproducibility-statistical and error analysis-application studies - relevance of research

Unit 3: Intellectual Property Rights and Publication of Scholarly Papers:

[13 Hours]

IPR – Concept of IPR, nature and characteristics of IPR, origin and development of IPR, justification and rationale for protecting IPR, IPR and sustainable development, IPR and human rights, IPR issues in physical and biological sciences, Commerce and IPR issues**,** IPR issues in Social Sciences. Forms of IPR – copyrights, trademarks, patents, industrial designs, trade secrets, geographical indications – meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

Publication – Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and how to avoid it. Dissecting research papers. Data base and Research – Data bases – indexing data base, citation data base, Web of science, Scopus etc, Research Metrics – Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics – h-index, g-index, i10 index, Altmetric.

References:

1. Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
2. Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
3. David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
4. JayashreeWatal. Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
5. A K Singh. Tests, Measurements and Research Methods in Behavioral Sciences. BharathiBhawan (Publishers & Distributors), New Delhi
6. Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
7. Singh Y K. Fundamentals of Research Methodology and Statistics. New International (P) Ltd., New Delhi.
8. Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London
9. Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
10. Guidance Document-Good Academic Research Practices-September 2020 by UGC.

MBA

PH 303.2 BUSINESS RESEARCH METHODOLOGY

Instruction hours: 50

Credits 04 Total Marks: 100

COURSE OBJECTIVES

- To understand the basic framework of research process, research designs and techniques.
- To identify various sources of information for literature review and data collection.
- To understand research process and practices in relation to business environment and business problems.
- To familiarize students with survey research concepts, methods and techniques.
- To understand various report writing and citation techniques

LEARNING OUTCOMES

- To apply research and knowledge acquired in business decisions.
- To critically evaluate secondary data and apply it for optimum business decision making.
- To apply knowledge of research process and practices to assess business environment and solve business problems.
- To apply survey research concepts, methods and techniques in modern day research problem.
- To draft research proposals, report with citation techniques.

PEDAGOGY

This course will employ a mix of Lectures and Assignments. Case studies will be used to demonstrate the application of some research techniques. Includes Project Work which filed work to understand the intricacies of carrying out research, and also become discerning consumers of business research.

UNIT-I AN OVERVIEW OF RESEARCH MEHODOLOGY 10 Hours

Definition of Research; Objectives, Scope, Criteria, Characteristics, Importance of Research; Challenges for Research; Ethics in Research; Research Applications in Business Decisions.

Types of Research (from the point of Applications) - Basic Research, Applied Research;

Types of Research (from the point of Objectives) - Exploratory Research, Descriptive Research, Casual Research;

Types of Research (from the point of inquiry mode) - Qualitative & Quantitative Research;

Other Research Types: Empirical Research, Scientific Research, Social/Behavioral Research, Historical Research, Action Research.

UNIT-II CONCEPTS AND TOOLS FOR BUSINESS RESEARCH 8 Hours

Business Research; Business Research Process;Deductive & Inductive approach in research; Introduction to Constructs , Concepts, Variables & its Types.

Literature Review: Methods of Reviewing Literature; Theoretical and Conceptual Frameworks; Literature Map.

UNIT-III BUSINESS RESEARCH PROCESS 12 Hours

Management Dilemma,Defining the Research Problem; Formulating the Research objectives , research questions, research hypothesis ; Developing Research Proposal; Research Design ; Sampling Design- Sampling, Types- Probability sampling, Non-probability sampling, Steps involved in selection of sampling, Sample Size determination, Sampling Errors; Creating Research Instrument- Drafting questionnaire, Administering the questionnaire; Pre-testing the questionnaire- Pilot Testing;Criteria of good measurement- Reliability, Validity; Methods of data collection- Primary & Secondary Data Sources; Data Refining and Preparation; Processing of data- Editing, Coding, Classification, Tabulation; Data Analysis and Interpretation ; Research Reporting.

UNIT IV SURVEY RESEARCH 12 Hours

Nature of Surveys; Survey Objectives; Role of the participants- Researcher Role & Respondents Role; Types of Surveys- Census and Sample Surveys; The Survey Process;

Errors in Survey Research- Random Sampling Error Vs Systematic Error (bias); Ethical issues in Survey research.

Qualitative Research tools:

Interview methods, Delphi Technique, Focus Groups, Case study methods, Projective Techniques, Experience Survey, Observation Methods.

Scaling Techniques:

Type of Measurement scales-Nominal/ Ordinal/ Interval/ Ratio scales.

Classification of Scales: Comparative Scaling Techniques- Paired Comparison, Rank Order, Constant Sum Scaling; Non-Comparative Scaling Techniques-Rating scale, Likert Scale, Semantic Differential Scale, Stapel Scales.

UNIT-V REPORT WRITING **8 Hours**

Significance of Research report; Types of research report-Technical Report, Popular Report; Steps in writing Report, Layout of the research report, Mechanics of writing Research report, Precautions for writing reports, Standard methods of quoting Bibliography.

LEARNING RESOURCES

1. NeenaSodhi, Deepak Chawla (2011), Research Methodology Concepts & Cases, 2/e, Vikas Publishing House Pvt. Ltd.
2. Donald R. Cooper, Pamela S. Schindler, (2014), Business Research Methods, 12/e, Tata McGraw-Hill Co. Ltd,.
3. Kothari C.R. (2013). Research Methodology: Methods and Technique, 3/e, new age international publishers.
4. William G. Zikmund, Barry J. Babin, Jon C. Carr, and Mitch Griffin, (2011), Business Research Method, 8/e, Cengage Learning.
5. Srivastava T. N and ShailajaRego (2011), Business Research Methodology, Tata McGraw Hill.
6. Bell Emma and Broman Alan, (2016), Business Research Methods- 3/e, Oxford University.
7. Sekaran Uma and Bougie Roger (2016), Research Methods for business- A skill building Approach, 7/e, John Wiley & Sons publications.

MSc Software Technology

Research Methodology and Ethics

Course Objectives:

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.

Course Outcomes:

- Research output with philosophical base and greater relevance to the society
- Quality research with scientific methodology
- Production of good Research Reports
- Original Research following ethical guidelines and practices in conducting the research and publication of papers.
- More awareness on Intellectual property Rights and Patents.

Pedagogy: Class room lecture, seminars, assignments, case studies, projects, workshops, dissecting research papers.

Unit 1: Foundation of Research: (6 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research; Philosophy and Research Philosophy – Ontology, Epistemology, critical realism, interpretivism, post modernism, pragmatism – meaning, relevance and assumptions. Concept of Theory and Theory Building – deduction, induction and abduction. Research Strategies - meaning and types.

Unit 2: Research Methodology: (10 Hours)

Research Problem – selecting the problem, sources of problem, statement of a problem; Review of Literature – meaning and need for literature review, sources of literature review, reporting the review of literature, identification of research gap; Research Design – meaning, features of good research design, types of research design, significance and preparation of research design; Research Questions; Objectives of the study; Research Methodology: Analytical vs. Empirical Methods, Surveys, Case Studies, Controlled Experiments, Quantitative, Qualitative, and Mixed Methods, Choosing research methods, Validity threats; Introduction to Quantitative Research, Study Designs, Controlled Experiments, Elements and Methods, Data Collection – meaning, sources of data, Data Collection Techniques

Unit 3: Interpretation and Report Writing; (4 Hours)

Analysis of Data – Analysis and Interpretation of Quantitative Data, Descriptive Statistics; Research Report – meaning, features of a good Research Report, elements of Research Report, format of a Research Report, Appendices and References/ Bibliography – styles.

Unit 4: Research Ethics: (10 Hours)

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct – meaning, problems that lead to unethical behaviors, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Violation of public ethics, authorship and contributorship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions etc,. Selective reporting and misinterpretation of data. Best practices/standard setting initiatives and guidelines. Self-plagiarism.

Unit 5: Intellectual Property Rights (IPR) and Publication of Scholarly Papers:

(10 Hours)

IPR – Concept of IPR, nature and characteristics of IPR, IPR issues in physical and biological sciences, IPR issues in Social Sciences. Forms of IPR – copyrights, trademarks, patents, industrial designs,– meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

Publication – Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and how to avoid it.

References:

- Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
- Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
- David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
- Jayashree Watal. Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
- A K Singh. Tests, Measurements and Research Methods in Behavioral Sciences. Bharathi Bhawan (Publishers & Distributors), New Delhi
- Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
- Singh Y K. Fundamentals of Research Methodology and Statistics. New International (P) Ltd., New Delhi.
- Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London
- Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
- Selecting Empirical Methods for Software Engineering Research, Easterbrook et al
- Pfleeger, S.L. Experimental design and analysis in software engineering. *Ann Software Eng* **1,** 219–253 (1995). https://doi.org/10.1007/BF02249052
- Research Design. Qualitative, Quantitative, and Mixed Methods Approaches. By John W. Creswell, Fourth Edition. SAGE Publication, 2014

MCA

Research Methodology and Ethics

Course Objectives:

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.

Course Outcomes:

- Research output with philosophical base and greater relevance to the society
- Quality research with scientific methodology
- Production of good Research Reports
- Original Research following ethical guidelines and practices in conducting the research and publication of papers.
- More awareness on Intellectual property Rights and Patents.

Pedagogy: Class room lecture, seminars, assignments, case studies, projects, workshops, dissecting research papers.

Unit 1: Foundation of Research:(6 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research; Philosophy and Research Philosophy – Ontology, Epistemology,critical realism, interpretivism, post modernism, pragmatism – meaning, relevance and assumptions. Concept of Theory and Theory Building– deduction, induction and abduction. Research Strategies - meaning and types.

Unit 2: Research Methodology: (10 Hours)

Research Problem –selecting the problem, sources of problem, statement of a problem; Review of Literature – meaning and need for literature review, sources of literature

review, reporting the review of literature, identification of research gap; Research Design – meaning, features of good research design, types of research design, significance and preparation of research design; Research Questions; Objectives of the study; Research Methodology: Analytical vs. Empirical Methods, Surveys, Case Studies, Controlled Experiments, Quantitative, Qualitative, and Mixed Methods, Choosing research methods, Validity threats; Introduction to Quantitative Research, Study Designs, Controlled Experiments, Elementsand Methods,Data Collection – meaning, sources of data, Data Collection Techniques

Unit 3: Interpretation and Report Writing; (4 Hours)

Analysis of Data –Analysis and Interpretation of Quantitative Data, Descriptive Statistics;Research Report – meaning, features of a good Research Report, elements ofResearch Report, format of a Research Report, Appendices and References/ Bibliography –styles.

Unit 4: Research Ethics: (10 Hours)

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct –meaning, problems that lead to unethical behaviors, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Violation of public ethics, authorship and contributorship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions etc,. Selective reporting and misinterpretation of data. Best practices/standard setting initiatives and guidelines. Self-plagiarism.

Unit 5: Intellectual Property Rights (IPR) and Publication of Scholarly Papers:

(10 Hours)

IPR – Concept of IPR, nature and characteristics of IPR, IPR issues in physical and biological sciences, IPR issues in Social Sciences. Forms of IPR – copyrights, trademarks, patents, industrial designs,– meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

Publication –Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and how to avoid it.

References:

- Indian National Science Academy (INSA). (2019). Ethics in Science Education, Research & Governance
- Barbara H Stanley J Joan E Sieber, Gary B Melton. Research Ethics: A Psychological Approach. University of Nebraska Press
- David I Bainbridge (2012), Intellectual Property Rights. Long man Publication
- Jayashree Watal. Intellectual Property Rights in the WTO and Developing Countries. Oxford University Press
- A K Singh. Tests, Measurements and Research Methods in Behavioral Sciences. Bharathi Bhawan (Publishers & Distributors), New Delhi
- Leedy P D. Practical Research: Planning & Design. Washington: Mc Millan Publishing Co., INC
- Singh Y K. Fundamentals of Research Methodology and Statistics. New International (P) Ltd., New Delhi.
- Wallinman N. Your Research Project: A Step by Step Guide for the first time Researcher. Sage Publications, London
- Kothari C R. Research methodology: Research & Techniques. New Age International Publishers, New Delhi
- Selecting Empirical Methods for Software Engineering Research,Easterbrook et al
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M.Sc. Big Data Analytics

Research Methodology and Ethics (Non-Credit Course)

Course Objectives:

- To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
- To acquaint with the knowledge of methodology involved in a scientific Research
- To know writing of a good Research Report.
- To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
- Understand the process of Intellectual property Rights and its different forms and implications
- To know how to write research papers and publish research papers.
- To know the various aspects of research in the field of Data Analytics.

Course Outcomes Research output with philosophical base and greater relevance to the society

- Quality research with scientific methodology
- Production of good Research Reports
- Original Research following ethical guidelines and practices in conducting the research and publication of papers.
- More awareness on Intellectual Property Rights and Patents.
- Provide a better research perspective in the field of Data Analytics.
- Application of various Machine learning to the real-world problems.

Pedagogy: Class room lecture, laboratory experiments, seminars, assignments, case studies, projects, workshops, dissecting research papers.

Unit 1: Foundation of Research:(4 Hours)

Research – meaning, characteristics, objectives, motivation in research, need and importance of research. Types of Research -quantitative research, qualitative research, mixedresearch methods, Research methods in AI/ ML, Concept of Theory and Theory Building –deduction, induction and abduction. Research Strategies - meaning and types.

Unit 2: Research Methodology: (10 Hours)

Research Problem – meaning, selecting the problem, sources of problem, statement of a problem; Review of Literature – meaning and need for literature review, sources of literature review, reporting the review of literature, identification of research gap; Variables – meaning, types of variables and selection of variables, Measurement and scaling Techniques; Data transformation, Data processing.

Research Design – meaning, features of good research design, types of research design, significance and preparation of research design; Research Questions; Objectives of the study;

Literature review &Research Hypotheses – meaning and importance kinds of hypotheses, formulating hypotheses.

Sampling and Sample Design – population, sample, sample unit and sampling, requisites of sampling, types of sampling and size of sample;

Data Collection – meaning, sources of data, preparation of questionnaire, primary data, secondary data – journal data, annual reports, print and social-media, blogs, customer reviews and experiences, vlogs, videos, web content and images. Making sense of content and converting into metrics and the process of data sharing of an experiment. Data Preparation process for analysis.Reliability and Validity in Research.

Unit 3: Interpretation and Report Writing; (6 Hours)

Processing &Analysis of Data – tabulation, choosing appropriate statistical tests, appropriate software and programming tools to be used (R/Python/Power BI/ tableau...),interpretation and testing of hypotheses. Research Report – meaning, features

of a good Research Report, elements ofResearch Report, format of a Research Report, Appendices and References/ Bibliography –styles, Findings & Conclusions, Software tools for paper formatting like Latex andSoftware's for detection Plagiarism.

Unit 4: Research Ethics: (10 Hours)

Ethics – meaning and definition, Ethics Vs moral philosophy, nature of moral judgments and reactions. Rights and obligations of Research Participants. Scientific conduct – ethics with respect to science and research, intellectual honesty and research integrity. Scientific misconduct – falsification, fabrication and plagiarism. Publication ethics – meaning and importance, conflicts of interest, publication misconduct –meaning, problems that lead to unethical behaviors, types of publication misconduct, identification of publication misconduct, complaints and appeal. Redundant publication – duplicate and overlapping publications, salami slicing. Violation of public ethics, authorship and contributorship. Predatory publishers and journals – software to identify predatory publications – journal finder/journal suggestions tools by JANE, Elsevier journal finder, Springer journal suggestions etc. Selective reporting and misinterpretation of data. Best practices/standard setting initiatives and guidelines. Self-plagiarism. Ethical aspects in data collection and legal aspects in case of data breach &Ensuring confidentiality and privacy of person while publishing data.Ethics in terms of Fairness, Reliability & Safety, Privacy & Security, Inclusiveness, Transparency and Accountability.

Unit 5: Intellectual Property Rights (IPR) and Publication of Scholarly Papers:

(10 Hours)

IPR – Concept of IPR, nature and characteristics of IPR, origin and development of IPR, justification and rationale for protecting IPR, IPR and sustainable development, IPR and human rights, IPR issues in physical and biological sciences, Commerce and IPR issues**,** **IPR** issues in Social Sciences. Forms of IPR – copyrights, trademarks, patents, industrial designs, trade secrets, geographical indications – meaning, features and application of different forms of IPRs. Filing and Registration process of IPRs.

Publication –Scholarly/research article – meaning and features of scholarly article. Successful scientific writing – process. Reference/ bibliography writing, Plagiarism and

how to avoid it. Dissecting research papers.Data base and Research – Data bases – indexing data base, citation data base, Web of science, Scopus etc, Research Metrics – Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics – h-index, g-index, i10 index, Altmetric.

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"ATTESTED"

Principal
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