

Course Outline

Research Methodology

DOCTORAL COURSE WORK 2023

(ENGINEERING AND TECHNOLOGY, APPLIED SCIENCES, MANAGEMENT,
HUMANITIES, LAW, PHARMACY, ALLIED HEALTH AND FORENSIC
SCIENCES)



CENTURION
UNIVERSITY
*Shaping Lives...
Empowering Communities!*

At – Ramchandrapur, P.O Jatni, Dist: Khurda, 752050

<http://www.cutm.ac.in>

RESEARCH METHODOLOGY

1. Nomenclature

Subject Name	Code	Type of course	Credit	T-P-P	Prerequisite
RESEARCH METHODOLOGY	CUTM2443	Theory		4-0-0	

2. Course Objective

- The objective of the course is to introduce early career researchers to the methodology, methods and techniques of research.
- The course aims to present research as a dynamic process beginning from questions to answers, showing clearly how researchers progress from one stage to the next.
- To understand some basic concepts of research and its methodologies.
- To organize and conduct research (advanced project) in a more appropriate manner.

3. Learning Outcome

- Identify the overall process of designing a research study from its inception to its report.
- Familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
- Know the primary characteristics of quantitative research and qualitative research and identify a research problem stated in a study.
- Familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction.
- Familiar with conducting a literature review for a scholarly educational study
- Students can understand the ethical and philosophical issues associated with research in education.
- This study provides knowledge on various modes of presenting and disseminating research findings.
- Enable students to acquire expertise in the use and application of the methods of data collection and analysis.
- Provide learning opportunities to critically evaluate research methodology and findings.
- Enable students to be reflexive about their role and others' roles as researchers.

4. Pedagogy and Expectations from the Students

The readings for the course will be from a variety of sources. The course will be delivered through formal lectures, self-readings, seminars, exercises and project work undertaken by the students. The conceptual frameworks in the field being researched will be examined. Critically reviewing and analyzing research works will also be adopted in this course.

The sessions follow the logic of conducting a research beginning with a brief introduction to ontology and epistemology which enable the conceptualization of a research project. This will be followed by an in-depth understanding of methodological approaches and methods to be adopted. Finally, the focus will be on critical analysis of the data gathered and the presentation of the same in reports.

After few introductory sessions, the focus will be in analyzing some research projects to determine what was right and what could have been done better. It will help students to determine the approaches that they can be engaged in during their research.

Students are welcome to interact with the instructors outside the class, on topics/concepts that could not be covered within the limited time of the class sessions. Students are expected to follow the Research Style Manual of the Centurion University available in its website.

5. Evaluation

The evaluation will be done in 2 parts (Internal and External examination) for the course:

Internal – 40% marks

External – 60% marks

Internal examination will be conducted by the RM faculty for each discipline. External examination will be open-book and conducted at the end of the semester. Students will be notified about the same a fortnight before the examination.

6. Academic Misconduct

Plagiarism in the university is considered as the presentation of the work, idea or creation of another person as though it is your own. Any work submitted must be one's own. When own ideas, texts, quotes and information are not used one must identify the source of that work with complete and comprehensive referencing. The Centurion University of Technology and Management will automatically fail the student who do not suitably acknowledge the work of others.

Plagiarized material can be drawn from, and presented in, written, graphic and visual form, including electronic data, and oral presentations. Plagiarism occurs when the origin of the material used is not appropriately cited.

7. Schedule of Sessions

Module 1

Overview and orientation of the course: What constitutes research? An overview of history of mankind and the centrality of human beings (anthropocentricism). Understanding basic concepts of research such as Ontology, Epistemology, Methodologies and Methods.

Module 2

Types of Research

Introduction covering the importance of different methodologies. Discussion with examples – Experimental, Descriptive, Survey, Ethnographic, Heuristic, Action Research, Discourse Analysis, Evaluation methodology.

Module 3

Selecting and defining a research problem: What is research problem, selecting the problem, necessity of defining the problem, technique involved in defining a problem, Hypothesis and its functions.

Research Design: Meaning of research design, need for research design, features of a good design, important concepts relating to research design, different research designs, basic principles of experimental designs, important experimental designs.

Module 4

Literature Review: What is literature review? Why the need for literature review? How to carry out acritical literature review?

Definition of literature review; Purpose and significance; Sources of literature and; Procedure

Module 5

Sampling: Census and sample survey, implications of sample design, steps in sample design, criteria for selecting a sampling procedure, characteristics of a good sample design, different types of sample design.

(DISCIPLINE-SPECIFIC)

MANAGEMENT AND HUMANITIES

Module 6

Measurement and Scaling: Measurement and Scaling Techniques: Measurement in research and measurement scales, Errors in measurements, Tests for sound measurements, Technique for developing measurement tools. Scaling: Meaning of scaling, Scale classification bases, Important scaling techniques.

Module 7

Data Collection: Methods of Data Collection: Collection of primary data, observation method, interview method, data collection through questionnaires and schedules, other methods of data collection including Case study method, collection of secondary data, appropriate method for data collection.

Module 8

Data Analysis: Analysis and Interpretation in Quantitative and Qualitative Research. Data Presentation. Central Tendency and Dispersion, Associations, Tests of Significance.

SCIENCES AND TECHNOLOGY

Module 6

Data Analysis: Data Errors - Identification of Data Errors - Causes and Types of Data Errors. Error Analysis - Evaluation of uncertainties for complicated Data Reduction. Statistical Analysis of Experimental Data - Probability Distribution - Gaussian and other Distributions. Analysis of variance (ANOVA), least significance difference (LSD) test; tests of significance: z-test, t-test, and Chi-square test of Goodness of Fit Method of least squares - Correlation Coefficient Multivariable Regression- Standard Deviation Student's t- Distribution. Graphical Analysis and Curve Fitting - Choice of Graph's Formats - General considerations in Data Analysis.

Module 7

Hypothesis Testing, Experimental Methods, Theoretical Methods, Observational and Exploratory method, Product Design Method.

Module 8

Basic concepts of modelling of Engineering systems – static and dynamic model – Model for prediction and its limitations. System simulation - validation. Use of optimization techniques – Genetic Algorithm, Simulated Annealing, Particle Swarm Optimization.

PHARMACY, ALLIED HEALTH, FORENSIC SCIENCES

Module 6

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Module 7

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Module 8

Interpretation of Results and Data- Optimization Technique Maxima & Minima, Conditions of optimality; Linear Programming Problem- Introduction, Formation of LPP, Graphical

method of solution. Application of Software Latex- Writing Paper, Thesis, Report, Bibliography, BEAMER for presentation.

Module 9

Pharmacy and Allied Health - Software for drug formulation optimization (DoE) and concept on QBD (Quality by Design), data interpretation by Origin, Insilico activity of drug., Computer Aided Drug Design (CADD), Virtual screening of huge compound database by using Pharmacophore mapping and docking methods. Herbal Drug Regulatory affairs and Gene therapy.

LAW

Module 6

Ethics in Legal Research:

Meaning of Ethics; Why is Ethics in Research?; Codes and Policies for Legal Research Ethics; Guidelines for Research Ethics and the Law.

Module 7

Methods of Law-Making:

Statutes by Legislation; Codes as Statutes; Delegated or Subordinate Legislature; Administrative and Executive Orders; Researching Statutes; Interpretation of statutes; Purposive Approach: The Mischief Rule; Historical Interpretation; Precedents (Stare decisis)

Module 8

Legal Reasoning in Research:

Meaning of Logic; Fallacies in Logical Reasoning; Scientific Legal Reasoning; Relation of Logic to Law (Legal Logic); Deductive Method; Steps in the Deductive Method; Inductive Method

Module 9

Source of Legal Materials for Legal Research

Legislative Material; Precedents (Judicial Writings); Merits of Precedents; Demerits of Precedents; Customs - Essentials of a valid custom, other relevant literature and published materials.

Recommended Text Books

1. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
2. Bjorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
3. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
4. Graves N, Varma V: Working for a doctorate Toutledge 1997.
5. Graziano, A., M., and Raulin, M., L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.

6. Leedy., P., D.: Practical Research – Planning and Design, Eighth Edition, Pearson., 2005.
7. Myneni, S. R., - Legal Research Methodology, Allahabad Law Agency, 2017, ISBN-13978-8189530983\
8. James C. Van Horne, Standford University, Financial Management and Policy, Prentice Hall, 12th Edition, ISBN 0-13-032657-7
9. James R. McGuigan, R. Charles Moyer, Frederick H. deB. Harris, Managerial economics – applications, strategy and Tactics, 12th Edition,
10. Kothari C. R., Research Methodology-Methods and Techniques, Second Edition, New Age International, New Delhi, 2004, ISBN (13) : 978-81-224-2488-1
11. Walpole, R.A., Myers, R.H., Myers, S.L. and Ye, King: Probability and Statistics for Engineers and Scientists, Pearson Prentice Hall, Pearson Education Inc., 2007