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**Subject Title:** CWR-698 Research Methodology ✓

**Credit hours:** (2-1) Elective

**Description**

This course will provide an opportunity for participants to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment.

**Course objectives:**

The primary objective of this course is to develop a research orientation among the scholars and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. More Specifically

- To develop understanding of the basic framework of research process in Water Resource Engineering
- To develop an understanding of various research designs and techniques used in Water Resource Engineering
- To identify various sources of information for literature review and data collection.
- To develop an understanding of the ethical dimensions of conducting applied research.
- Appreciate the components of scholarly writing and evaluate its quality.

**Course Learning Outcomes**

Upon successful completion of this course you should be able to:

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CLO 1: Apply the concepts and skills required for the process and practice of research in Water Resource Engineering

CLO 2: Understand and critically evaluate research literature.

CLO 3: Analyze problems and synthesize suitable solutions, specifically to analyze research problem to define suitable research questions and devise a plan to answer these questions.

CLO 4: Investigate appropriate research methodologies used in Water Resource Engineering

CLO 5: Communicate effectively with a variety of audiences through a range of modes and media, specifically, write reports and make presentations as suitable for a general Water Resource Engineering audience

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## CLOs and PLOs mapping

Sr #	CLO	BTL	PLOs
1	CLO 1: Apply the concepts and skills required for the process and practice of research in Water Resource Engineering	3	PLO 1
2	CLO 2: Understand and critically evaluate research literature	2	PLO 1
3	CLO 3: Analyze problems and synthesize suitable solutions, specifically to analyze research problem to define suitable research questions and devise a plan to answer these questions	4	PLO 3
4	CLO 4: Investigate appropriate research methodologies used in Water Resource Engineering	2	PLO 4
5	CLO 5: Communicate effectively with a variety of audiences through a range of modes and media, specifically, write reports and make presentations as suitable for a general Water Resource Engineering audience	3	PLO 4

### **Evaluation**

- Assignments
- Presentation
- Exams (Mid, Final and Quiz)

### **Course contents:**

1. Introduction to research – The role of research, research process overview
2. Philosophies and the language of research theory building – Science and its functions, what is theory and the meaning of methodology
3. Thinking like a researcher – Understanding Concepts, Constructs, Variables, and Definitions
4. Problems and Hypotheses – Defining the research problem, Formulation of the research hypotheses, the importance of problems and hypotheses
5. Research design – Research formulation and critical literature review, process for finding the research gap
6. Methods of data collection – Secondary data collection methods, qualitative methods of data collection, and Survey methods of data collection
7. Data measurement and scaling – Types of measurement scales; Questionnaire designing – Reliability and Validity
8. Sampling techniques – The nature of sampling, Probability sampling design, Nonprobability sampling design, Determination of sample size
9. Processing and analysis of data\_ use of commonly used software in water resource engineering, presentation and interpretation of results, Design and application of algorithms
10. Ethical issues in conducting research

11. Thesis and technical Report writing- Title page, Abstract, Introduction, Methodology, Results, Discussion, References, and Appendices //

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