Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-1(M.Tech)

Subject: Research Methodology- METXX11501

Type of course: Multidisciplinary

Prerequisite: Nil

Rationale:

This course is designed to introduce students to the scientific research methodology with a focus on thesis development and presentation. The course emphasizes conducting a comprehensive literature review, critically analyzing existing studies, identifying research gaps, formulating research problems, and developing models using analytical or experimental approaches. Students will also learn to validate their models, analyze results, and propose effective solutions to their identified research problems. Upon completion, students will be able to clearly present, explain, and defend their research findings in a logical and professional manner.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
03	00	00	03	60	30	10	00	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE – End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA-Active Learning Activities.

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Course Content:

Sr. No	Course content	Hrs.	% Weightage
1	**Introduction to Research Methodology:** Meaning and importance of research, Definitions and characteristics of research, Objectives and significance of research in engineering, Types of research: qualitative, quantitative, mixed methods, analytical, experimental, exploratory, descriptive, applied & fundamental, Research methods vs. research methodology, Research process and phases of research, Criteria of good research, Research ethics and responsible conduct in research	15	25
2	**Research Problem Identification & Literature Review:** Identification of a broad research area, Selecting and defining a research problem, Techniques for problem formulation Finding good literature: (1)Sources of scholarly literature (journals, databases, indexing platforms),(2)Strategies for literature search and information retrieval,(3)Identifying key ideas in scholarly papers, Writing notes and organizing literature, Critical review of literature, Identifying research gaps and research objectives	15	25
3	**Research Design, Sampling & Data Collection:** Meaning and importance of research design, Concepts related to research design, Sampling fundamentals: meaning, need, and principles, Types of sampling techniques, Data collection methods: primary & secondary sources, Measuring and scaling techniques, Uncertainty analysis, Hypothesis formulation and testing (basics)	15	25
4	**Interpretation and Report Writing** Meaning and techniques of interpretation, Significance of research report writing, Layout and structure of a research report / thesis, Types of research reports, Precautions and best practices for writing research reports, Presentation and defense of research work	15	25

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Literature Review** Students shall conduct a literature review on a faculty-assigned research problem. Scholarly research articles must be reviewed, summarized, and compiled in a structured format. Students are required to upload the compiled Literature Review on the GMIU Web Portal.	10
2	**Hypothesis Formulation & Testing** Based on the literature review, students shall formulate appropriate research hypotheses and apply suitable techniques to test and interpret them. Students are required to upload the Hypothesis Formulation & Testing report on the GMIU Web Portal.	10
3	**Sampling Techniques Activity** Students shall prepare a report on various sampling methods, including definitions, applications, and examples relevant to their research. Students are required to upload the Sampling Techniques report on the GMIU Web Portal.	10
4	**Data Collection Methods** Students shall design and demonstrate different data collection methods/tools (survey, experiment, questionnaire, etc.) related to the research problem. Students are required to upload the Data Collection report on the GMIU Web Portal.	10
5	**Research Report** Based on a research problem provided by the faculty, students shall apply research methodology, analyze findings, and prepare a mini research report. Students are required to upload and submit the final Research Report on the GMIU Web Portal.	10
	Total	50

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	25%	20%	10%	-	20%

Course Outcome:

After learning the course, the students should be able to:	
CO1	Explain the fundamentals of research methodology and differentiate between types of research, research methods, and research processes, including ethical practices.
CO2	Identify and formulate a research problem by conducting a structured literature review, analyzing scholarly articles, and determining research gaps and objectives.
CO3	Apply appropriate research design, sampling techniques, and data collection methods to develop a valid and reliable research framework.
CO4	Interpret research data, prepare a structured research report / thesis, and present findings effectively while adhering to academic writing standards.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

1. Kothari, C. R. & Garg, Gaurav: *Research Methodology: Methods and Techniques,* New Age International Publishers.
2. Stuart Melville & Wayne Goddard: *Research Methodology: An Introduction for Science and Engineering Students,* JUTA Academic.
3. Ranjit Kumar: Research Methodology: A Step-by-Step Guide for Beginners, SAGE Publications Pvt. Ltd.
4. John W. Creswell & J. David Creswell: *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches,* SAGE Publications Pvt. Ltd.