

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Master of Technology				Branch/Spec.		Chemical Engineering	
Semester		I				Version		1.0.0.0	
Effective from Academic Year			2026-27			Effective for the batch Admitted in			July 2026
Subject code		3CH1106		Subject Name		Research Methodology I			
Teaching scheme						Examination scheme (Marks)			
(Per week)		Lecture (DT)		Practical (Lab.)		Total			
	L	TU	P	TW			CE	SEE	Total
Credit	1	0	0	0	1	Theory	60	40	100
Hours	1	0	1	0	1	Practical	00	00	00
Pre-requisites:									
Not Applicable									
Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	Apply advanced experimental, computational, or analytical tools to execute independent research work.								
CO2	Interpret, validate, and critically analyze research data with appropriate statistical and uncertainty analysis.								
CO3	Prepare high-quality technical documents such as research papers, reports, and thesis chapters following publication ethics.								
CO4	Demonstrate understanding of intellectual property rights, research management, and professional presentation of research outcomes.								
Theory syllabus									
Unit	Content								Hrs
1	Introduction to Research: Meaning and objectives of research, Types of research: basic, applied, experimental, and computational, Research process and workflow in chemical engineering, Ethics in research and academic integrity								8
2	Problem Identification and Literature Review: Identification and formulation of research problems, Research gap analysis, Sources of literature: journals, patents, theses, databases (Scopus, Web of Science, Google Scholar), Techniques for effective literature review and reference management tools (Mendeley/Zotero)								7
3	Research Design and Methodology: Experimental research design, Variables, hypotheses, and validation, Introduction to modeling and simulation-based research, Selection of materials, methods, and instrumentation								8
4	Data Collection and Analysis: Experimental data collection techniques, Errors, accuracy, and precision, Basic statistical tools: mean, standard deviation, regression, Graphical representation and interpretation of data								7
Text Books									
1	Research Methodology: A Step-by-Step Guide for Beginners – Ranjit Kumar								
2	Research Methods for Engineers – David Thiel								
3	The Craft of Research – Wayne C. Booth, Gregory G. Colomb & Joseph M. Williams								
Reference Books									
1	Practical Research: Planning and Design – Paul D. Leedy & Jeanne Ellis Ormrod								
2	Research Design: Qualitative, Quantitative, and Mixed Methods – John W. Creswell								
ICT/MOOCs references									
https://onlinecourses.nptel.ac.in/noc23_ge36/preview									

Mapping of CO with PO and PSO:														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	-	3	2	-	-	-	-	-	1	3	-	-
CO2	2	3	-	3	2	-	-	-	-	-	1	3	-	-
CO3	-	-	-	2	-	-	-	3	2	3	1	2	2	1
CO4	-	-	-	1	-	2	-	3	1	2	2	-	2	3