MAHATMA GANDHI UNIVERSITY

Kottayam, Kerala

Undergraduate Programmes (HONOURS)
2024 Admission Onwards

SYLLABUS			
SIGNATURE COURSE			
Name of the College	UC College, Aluva		
Faculty/ Discipline	Physics		
Programme	BSc (Hons) Physics		
Course Coordinator	Shinoj V K		
Contributors	Pramod Dominic		
Course Name	Research Methodology, Scientific Writing and LaTeX for Physics		
Type of Course	SEC		
Specialization title	This Signature Course does not have a specialization.		
Course Code	MG5SECPHYA00		
Course Level	300		
Course Summary	This Skill Enhancement Course equips BSc Physics students with essential research methodology, scientific writing, LaTeX-based documentation skills, and professional career readiness. The course provides structured training in research problem formulation, hypothesis development, experimental design, literature review, data analysis, research ethics, and final year project report preparation. A major component includes 15 hours of hands-on LaTeX training for professional scientific typesetting and CV preparation.		
Semester	5	**Credits**	3
Course Details	**Learning Approach** / **Lecture** / **Total Hours**: Credits / 3 / 45		
Pre-requisites, if any	Familiarity with elementary laboratory experiments and report writing. Basic understanding of mathematical tools used in Physics (algebra, calculus, graphs). Fundamental computer literacy (word processing, internet browsing, file handling).		

Course Outcomes (CO)

Number of COs		**4**	
CO No.	**Expected Course Outcome**	**Learning Domains ***	**PO No**
1	Identify and formulate research problems and hypotheses in Physics	An	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10
2	Design experiments and analyse data	An	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10
3	Prepare structured scientific reports with research ethics	E	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10
4	Use LaTeX for scientific documentation and CV preparation	A	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	2	1	2	2	-	1	1	2
CO 2	3	3	3	-	1	-	-	-	1	1
CO 3	3	3	3	1	-	2	-	1	2	3
CO 4	2	2	2	3	-	-	-	-	1	1

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Research Approaches & Problem Formulation			
	1.1	Approaches in Research: Theoretical, Experimental, Computational; Basic vs Applied	3	["1"]
	1.2	Identification, defining and delimiting research problems	3	["1"]
	1.3	Research questions, hypothesis, characteristics of good hypothesis	3	["1"]
	1.4	Design of experiment: variables, accuracy, precision, error basics	3	["2"]
	1.5	Types of data, data collection and basic data analysis	3	["2"]
2	Literature Review, Scientific Writing & Ethics			
	2.1	Review of literature and effective search strategies	3	["3"]
	2.2	Structure of final year report	5	["3"]
	2.3	Presenting findings and interpreting results	3	["2"]
	2.4	Research ethics, plagiarism, citation practices	4	["3"]
3	Scientific Typesetting using LaTeX			
	3.1	LaTeX basics, document structure, equations	5	["4"]
	3.2	Figures, tables, cross-referencing, BibTeX	5	["4"]
	3.3	Mini project report and CV preparation in LaTeX	5	["4"]

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Leverage a blended learning approach with a mix of lectures, writing workshops, hands-on LaTeX sessions, literature search exercises, and student seminars.

Assessment Types	**MODE OF ASSESSMENT** Mode of Assessment: Theory **A. Continuous Comprehensive Assessment (CCA)** **• Theory – 25 Marks** Formative assessment • Quiz • Assignments (Research Proposal, Literature Review, LaTeX Mini Project Report, CV Preparation) • Seminar Presentation Summative assessment • MCQ Exams / Short Written Test **B. End Semester Evaluation (ESE)** **• Theory – 50 Marks** Assessment Methods – Theory + Skill test Duration of Examination – 1.50 Hrs Pattern of examination for Theory – Non-MCQ Different parts of written examination – Part - A , B Answer Type: ∘ PART - A ∘ MCQ - (30 out of 30) – 30 × 1 = 30 ∘ PART - B ∘ Skill assessment - (1 out of 1) – 1 × 20 = 20

References

- 1. C.R. Kothari – Research Methodology: Methods and Techniques 2. Ranjit Kumar – Research Methodology: A Step-by-Step Guide for Beginners 3. Day & Gastel – How to Write and Publish a Scientific Paper 4. Dilip Datta - LaTeX in 24 Hours: A Practical Guide for Scientific Writing

Suggested Readings

- 1. C. George Thomas - Research Methodology and Scientific Writing 2. Sanjeev Singh Yadav - Scientific Research Methodology: Principles, Tools, and Techniques 3. Leslie Lamport – LaTeX: A Document Preparation System

Affidavit

- We, UC College, Aluva and Shinoj V K, agree to permit the use of our proposed course syllabus by other faculty members within the same discipline for course delivery at their respective institutions.
- We, UC College, Aluva, agree to appoint a new course coordinator for the proposed Research Methodology, Scientific Writing and LaTeX for Physics in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the signature course, for as long as the college offers this programme.
- We, UC College, Aluva and Shinoj V K, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.