University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK1MDCPHY100**				
Course Title	**ELEMENTARY DATA ANALYSIS**				
Type of Course	**MDC**				
Semester	**I**				
Academic Level	**100 - 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 Hrs	-	-	3 Hrs
Pre-requisites					
Course Summary	By the end of the course, students will have gained proficiency in collecting, analysing, and interpreting experimental data in Physics, preparing them for further studies or careers in scientific research or related fields. The course emphasizes hands-on experience with real-world datasets and practical applications, aiming to equip students with the ability to extract meaningful insights from experimental measurements.				

BOOKS FOR STUDY:

1. Goon A. M., Gupta M. K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I& II, 8th Edn. The World Press, Kolkata.
2. Hogg, R.V., Tanis, E. A. and Rao J. M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
3. Mood, A. M. Graybill, F. A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.

5. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh · 2011,An Introduction to Probability and Statistics, Wiley.
6. Curtis Frye, Microsoft Excel 2019 Step by Step- 250 Ways to a Calmer You ,2019, Microsoft.

BOOKS FOR REFERENCE:

1. K. F. Riley, M. P. Hobson and S. J. Bence, 2006, Mathematical Methods for Physics and Engineering Third Edition, Cambridge University Press.

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**Presentation of Data (Book:1, 4)**	**10**	
	1	Data: Quantitative and Qualitative, Attributes, Variables, Scales of Measurement- Nominal, Ordinal, Interval and Ratio.	2	1
	2	Presentation of Data by Tables and Diagrams- Tabular and Graphical, Including Bar Diagram, Histogram, Pie Chart, Frequency Polygon and Ogives.	3	1
	3	Bivariate data: Definition, Scatter Diagram	2	1
	4	Frequency Distributions for Discrete and Continuous Variables, Graphical Representation of a Frequency Distribution by Histogram and Frequency Polygon, Cumulative Frequency Distributions.	3	1
II		**Probability (Book: 2, 5)**	**10**	
	5	Introduction, Random Experiments, Sample Space, Events and Algebra of Events	3	2
	6	Definitions of Probability – Classical, Statistical, and Axiomatic.	2	2
	7	Conditional Probability, Laws of Addition and Multiplication, Independent Events	2	2
	8	Theorem of Total Probability, Bayes' Theorem and its Applications.	3	2

III	**Statistical Methods (Book: 1, 3)**		**10**	
	9	Statistical Methods: Definition and Scope of Statistics, Concepts of Statistical Population and Sample.	2	1
	10	Central Tendency and its Measures: Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean, Quartile and Percentiles.	3	3
	11	Measures of Dispersion: Range, Skewness, Mean Deviation, Standard Deviation, Moments, Coefficient of Variation	3	3
	12	Standard Probability Distributions: Normal, Binomial and Poisson.	2	3
IV	**Introduction to Spreadsheet (Book: 6)**		**6**	
	13	Cell Reference – Entering Data, Formatting, Editing Data	1	4
	14	Using Formulas – Filters ,Sorting, Data Analysis, Pivot Tables	2	4
	15	Mathematical and Statistical Functions, Creating Charts (Pie Chart, Column Chart and Line Chart)	3	4
V*	**Hands On Training (Book: 6) Any Five.**		**09**	
	16	Using Spreadsheet, calculate the mean, median, and mode.	9	5
	17	Using Spreadsheet, calculate the range and standard deviation.		5
	18	Using Spreadsheet, compute standard deviation, range and skewness of the data.		5
	19	Using Spreadsheet, organize data in a list alphabetically, numerically or chronologically.		5
	20	Using Spreadsheet, plot Ohm's law.		5
	21	Using Spreadsheet, create a formula to find the Income tax of an individual that contains nested functions.		5
	22	A worksheet contains names and marks in 3 subjects. Calculate total marks and construct 3D Pie chart for total marks.		5

	23	Using Spreadsheet, Construct 2D line chart for a given set of data.		5
	24	Using Spreadsheet, Construct 2D column chart for a given set of data.		5
	25	From the data given, using the most appropriate formulas and functions, (i). Calculate the total rainfall for the week and the year respectively. (ii). Find the lowest rainfall for the week and the year respectively. (iii). Find the highest rainfall for the week and the year respectively. (iv). Find the mean rainfall for the week and the year respectively.		5

COURSE OUTCOMES

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Summarize the basics of data handling, various quantitative techniques involved and its presentation.	R, U	4
CO-2	Illustrate probability theory, its applications and enable them to analyse and make decisions in uncertain situations, and solve problems in diverse contexts.	R, U	4
CO-3	Administer the statistical methods of handling data.	R, U	4
CO-4	Develop the proficiency in utilizing formulas to conduct calculations and streamline tasks through automation.	U, Ap	4
CO-5	Interpret, apply and visualize data using Spreadsheet software, enabling them to make informed decisions and solve real-world problems efficiently.	U, Ap	4

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: ELEMENTARY DATA ANALYSIS

Credits: 3:0:0 (Lecture: Tutorial: Practical)

CO No.	CO	PO / PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
CO-1	Summarize the basics of data handling, various quantitative techniques involved and its presentation.	PO 1,4/ PSO 4	U	F,C	L	-
CO-2	Illustrate probability theory, its applications and enable them to analyse and make decisions in uncertain situations, and solve problems in diverse contexts.	PO 1,2/ PSO 4	U	F,C	L	-
CO-3	Administer the statistical methods of handling data.	PO 1,2,4/ PSO 4	U	F,C	L	-
CO-4	Develop the proficiency in utilizing formulas to conduct calculations and streamline tasks through automation.	PO 1,2,6,7/ PSO 2,4	U, Ap	F,C,P	L	-
CO-5	Interpret, apply and visualize data using Spreadsheet software, enabling them to make informed decisions and solve real-world problems efficiently.	PO 1,2,6,7/ PSO 2,4	U, AP	F,C,P	L/T	P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	-	-	-	2	-	-	-	1	-	-	2	-	-	-	-
CO-2	-	-	-	2	-	-	-	1	1	-	-	-	-	-	-
CO-3	-	-	-	2	-	-	-	1	1	-	2	--	-	-	-
CO-4	-	2	-	2	-	-	-	1	2	-	-	-	2	2	-
CO-5	-	2	-	2	-	-	-	1	2	-	-	-	2	2	-

Correlation Levels:

Level	-	1	2	3
Correlation	Nil	Slightly / Low	Moderate / Medium	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics:

CO No	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO-1	-	-	-	✓
CO-2	✓	-	-	✓
CO-3	✓	-	-	✓
CO-4	✓	✓	-	✓
CO-5	✓	✓	-	-