Programme	Bachelor of Science in Solid State Physics (BS SS Physics)	Course Code	IDPS-301	Credit Hours	3 (3-0)
Course Title	**Probability and Statistics**				

Course Introduction

This course is to introduce the notions of probability and statistics to enable students to apply in the different fields of actions in physics. The concepts of data preparation and analysis is the key feature of this course.

Learning Outcomes

By the end of this course, students will be able to:

1. The data and its interpretation.
2. Analysis of data and summarizing the reports.
3. Core concepts of probability and applications.

	Course Content	Assignments/Readings
Week 1	**Unit-I** 1.1 Introduction to Statistics 1.1.1 Definition of Statistics, Population, sample Descriptive and inferential Statistics, Role of statistics in physics, Observations, Data	Statistics and Physics
Week 2	**Unit-II** 2.1 Discrete and continuous variables 2.1.2 Errors of measurement, Significant digits, Rounding of a Number	Round off some numbers
Week 3	**Unit-III** 3.1 Collection of primary and secondary data 3.2 Sources, Editing of Data. Exercises	What is primary data
Week 4	**Unit-IV** 4.1 Presentation of Data 4.1.1 Introduction, basic principles of classification and Tabulation	Present some data
Week 5	**Unit-V** 1.1 Constructing of a frequency distribution 5.1.1 Relative and Cumulative frequency distribution, Diagrams, Graphs and their Construction	Draw some graphs of data
Week 6	**Unit-VI** 6.1 Charts	Make flow charts

	6.1.1 Bar charts, Pie chart, Histogram, Frequency polygon and Frequency curve, Cumulative Frequency Polygon or Ogive, Histogram, Ogive for Discrete Variable. Types of frequency curves. Exercises	
Week 7	**Unit-VII** 7.1 Measures of Central Tendency 7.1.1 Introduction, Different types of Averages, Quintiles, The Mode, Empirical Relation between Mean, Median and mode	Take averages
Week 8	Mid Term Exams	
Week 9	**Unit-VIII** 8.1 Relative Merits and Demerits of various Averages 8.1.1 Properties of Good Average, Box and Whisker Plot, Stem and Leaf Display, definition of outliers and their detection. Exercises.	What is good average
Week 10	**Unit-IX** 9.1 Measures of Dispersion 9.1.1 Introduction, Absolute and relative measures, Range, The semi- Inter-quartile Range, The Mean Deviation, The Variance and standard deviation	What is standard deviation
Week 11	**Unit-X** 10.1 Change of origin and scale 10.1.1 Interpretation of the standard Deviation, Coefficient of variation, Properties of variance and standard Deviation	Set scale
Week 12	**Unit-XI** 11.1 Standardized variables 11.1.1 Moments and Moments ratios. Exercises	What are variables
Week 13	**Unit-XII** 12.1 Regression and Correlation 12.1.1 Introduction, cause and effect relationships, examples, simple linear regression, estimation of parameters and their interpretation. R1 and R2. Correlation. Coefficient of linear	What is regression

	correlation, its estimation and interpretation. Multiple regression and interpretation of its parameters. Examples	
Week 14	**Unit-XIII** 13.1 Probability and Random Variable 13.1.1 Introduction to probability, sample Space, Events, Lows of probability with their applications, Conditional probability, dependent and independent events, Bays theorem and its applications. Random variable discrete and continuous random variable with their application	Write example of probability function
Week 15	**Unit-XIV** 14.1 Mathematical Expectation 14.1.1 Mean, Variance etc. Statistical Packages and data analysis, SPSS software, Data analysis on excel and E Views etc.	Presentations
Week 16	Final Term Exams	

Textbooks and Reading Material

1. R.E. Walpole, Introduction to Statistics, Macmillan Publishing Co., Inc. New York, 3rd Ed, 1982.
2. F. Muhammad, Statistical Methods and Data Analysis, Kitab Markaz, Bhawana Bazar Faisalabad, 2005.
3. B L Agarwal, Basic Statistics New Age International, 2006.
4. Carver, Nash, Doing Data Analysis with SPSS version 14.

Teaching Learning Strategies

1. Course Teaching
2. Presentations
3. Quiz

Assignments: Types and Number with Calendar

1.
2.
3.
4.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.