

**St. Xavier's University, Kolkata**  
**Faculty of Science**  
**Value-Added/Skill Enhancement Courses to be Offered**  
**By**  
**Department of Statistics**

**Course Name: Reliability and Survival Analysis**

Credit: 2

Duration: 30 contact hours

Start Date: 19.02.2024

End Date: 30.04.2024

Mode of Class (Online/Offline/Hybrid): Offline

Intake Capacity: 30

Full Marks (FM): 100

Marks (QM): 50

Enrolment Date: 10/02/2024

Eligibility: Pursuing Graduate & above

Course Instructor(s): Dr. Aniket Biswas & Dr. Manisha Pal

About the Course:

This course explores the principles of reliability and survivability, focusing on their theoretical foundations and practical applications. It introduces key concepts such as reliability functions, hazard rates, and life distributions, along with their ageing properties. Students will learn about system reliability, including the modeling of independent and coherent systems. The course also covers statistical techniques for analyzing survival data, including methods for handling censored and truncated data. Estimation approaches like the Kaplan–Meier and Nelson-Aalen estimators are discussed, along with hypothesis testing for survival functions. Additionally, the course delves into semi-parametric models, with a focus on the Cox proportional hazards model and regression-based reliability analysis. By the end of the course, students will gain a strong foundation in reliability modeling, data-driven survival analysis, and the interpretation of system failure patterns, making them well-equipped for research and applied work in engineering, data science, and risk assessment.

Syllabi of the Course:

<b>Module No.</b>	<b>Module Name</b>	<b>Topic(s)</b>
1	Understanding reliability and survivability	Introduction to reliability and survivability; Concepts of reliability/survival function and hazard rate through examples; Hazard function and its relationship with reliability/ survival function; Applications of hazard function.
2	Life distributions and ageing properties	Common life distributions; Different ageing properties of life distributions and their relations; Loss of memory property.
3	System reliability	Reliability function of a system of independent components; Coherent systems with examples; Preservation of ageing properties in a system.
4	Censoring and Truncation	Different types of censoring and truncation; Likelihood function under censoring.
5	Inference based on survival data	Estimation of reliability/survival function; Parametric/Nonparametric estimation; Kaplan–Meier estimator; Nelson-Aalen estimator; Tests of equality of survival functions; Semi-parametric model: Cox proportional hazards model; The partial likelihood and estimation of regression coefficients; Estimation of the baseline hazard function.