Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCEC530	Road Safety and Risk Analysis	3	1	0	4

Course Objective

This course aims to provide a comprehensive understanding of road traffic accidents, their causes, and the methodologies used for crash investigation and analysis. It equips students with statistical tools for accident data analysis, risk assessment techniques, and methods for evaluating the effectiveness of road safety measures. Additionally, the course covers road safety audits to ensure systematic identification and mitigation of traffic hazards.

Learning Outcomes

Upon successful completion of this course, students will:

- Analyse road traffic accident scenarios, understand accident characteristics, and assess the influence of human factors on crashes.
- Identify crash-prone locations, interpret accident data, and apply crash reconstruction techniques.
- Utilize statistical methods to analyse accident frequency, severity, and risk factors while addressing methodological challenges.
- Conduct before-and-after studies to evaluate safety interventions and quantify their impact on crash rates.
- Understand crash types, risk assessment methods, and the application of extreme value theorem in traffic safety.
- Perform road safety audits, assess design standards, and identify potential safety issues through structured evaluations.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	**Introduction to Road Traffic Accidents:** Overview of road traffic accident scenarios in India, understanding accident characteristics and differentiation between accidents and crashes, influence of human factors on crashes, planning road networks and considering land use for safety, designing safer roads with a focus on junctions and links, principles of road safety engineering and strategies for improving road safety	6L	Understand accident characteristics, causes, and the role of human factors.
2	**Crash Investigation and Analysis:** Identifying crash-prone locations and diagnosing issues, methods for addressing crash problems and potential solutions, crash reporting procedures and data storage, interpreting crash data and prioritizing hazardous locations, understanding and constructing condition and collision diagrams, safety considerations for vulnerable road users, including pedestrians and	8L+ 4T	Identify hazardous locations and interpret crash data. Perform crash reconstruction and assess safety for vulnerable road users.

	bicyclists, provisions for individuals with disabilities in crash scenarios, basics of crash reconstruction, including physics concepts and speed estimation and calculations related to skid resistance, friction, drag, and acceleration in accidents.		
3	**Statistical Analysis of Accidents:** Application of descriptive statistics in accident data analysis, confidence intervals and hypothesis testing in crash studies, statistical models for analyzing accident frequency, severity, and duration, understanding time-dependent explanatory variables, analyzing unobserved heterogeneity, endogeneity, and issues related to under-reporting, Exploring spatial and temporal correlations in accident data and development of accident prediction models	8L + 4T	Utilize statistical models to analyse accident frequency, severity, and risk factors. Address methodological challenges like under-reporting and heterogeneity.
4	**Before and After Studies for Crash Analysis:** Before and after study, before and after study with control sites, calculation of crash modification factors, application of single and multiple safety improvement and their impacts on safety	6L+1T	Conduct safety evaluations using crash modification factors and assess the impact of various safety improvements.
5	**Crashes and Risk Analysis:** Types of crashes and conflicts, safety critical events, identification methods, various theorems and its application in risk assessment	8L+3T	Understanding of risk assessment techniques
6	**Road Safety Audits:** Procedure, aims and objectives, roles and responsibility, history of road safety audit, design standards, tasks, various stages of safety audits, problem identification, reporting of audits	6L+2T	Understanding to perform road safety audits across different stages of project development.
	Total Credit Hours	42L+14P	

Text Books:

1. Papacostas, C. S. (1987), Fundamentals of Transportation Engineering, Prentice Hall.
2. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning, Khanna.
3. Simon P Washington, Matthew G Karlaftis, Fred L Mannering "Statistical and Econometric Methods for Transportation Data Analysis", 2nd Edition, Chapman & Hall/ CRC Press (2010)

Reference Books:

1. May, A. D. (1990), Fundamentals of Traffic Flow, Prentice Hall.
2. Highway Capacity Manual (2000), Transportation Research Board, USA.
3. Limpert, Rudolf. "Motor vehicle accident Reconstruction and Cause Analysis." 5th Edition Levas Publishing Charlottesville WA (1999)
4. American Association of State Highway and Transportation Officials (AASHTO), Highway Safety Manual, 1st Edition, 2010
5. Indian Road Congress, "Road Safety Audit Manual" IRC: SP-88-2010
6. Indian Road Congress, "Highway Safety Code" IRC: SP-44-1996