



# SAFETY AND RISK ANALYTICS

## PROF. JHARESWAR MAITI

Department of Safety and Risk Analytics  
IIT Kharagpur

**PRE-REQUISITES :** Basic probability and statistics

**INTENDED AUDIENCE :** All Engineering, Science, and Management Students

**INDUSTRIES APPLICABLE TO :** 1. Manufacturing companies like GM, Tata Motors, Tata Steel 2. Process industries such as ONGC 3. Mining industry like Coal India Limited 4. Construction companies like L&T 5. General Electric 6. R&D organizations like DRDO

## COURSE OUTLINE :

The objective of this course is to impart students of both UG and PG levels, working professionals, and industry practitioners with a holistic view of safety and risk analytics applied to systems life cycle through advanced analytics and reporting techniques and technologies. Upon completion of this course, the students will know (i) types, sources and characteristics of safety data and their integration for organization-wide safety centric data model, (ii) safety data visualization and exploration, (iii) safety performance evaluation and monitoring, (iv) safety predictive models, (v) behavioral safety analytics, (vi) injury epidemiology, and (vii) safety related decision making. The concepts, methodologies, mathematics, techniques and algorithms needed for this course are drawn from engineering approaches, statistics, machine learning and data mining. The primary focuses of this course is learn from data, predict the future and take data driven decision making.

## ABOUT INSTRUCTOR :

Prof. Jhareswar Maiti, PhD, Professor, Department of Industrial & Systems Engineering, Indian Institute of Technology (IIT), Kharagpur has more than fifteen years of teaching, research and consulting experience on Safety Analytics, Quality Analytics and Engineering Ergonomics. He has published more than 70 papers in international and national journals of repute and more than 30 papers in conference proceedings. Till date, he has supervised 11 PhD candidates to successful completion and currently supervising 8 PhD research candidates. He has been executing a number of Industry-sponsored consulting and Government as well industry funded research projects. His current UAY project entitled Safety analytics save people at work from accidents and injuries was funded by MHRD, Ministry of Steel, and Tata Steel Limited. He has organized 17 training programmes and short-term courses for industry participants. Prof Maiti has been pursuing research on safety analytics, quality analytics, and engineering ergonomics including the applications of multivariate statistical modeling since 1995. Prof Maiti excels in teaching Safety Engineering, Safety Analytics, Work System Design, Quality Engineering, Design and Analysis of Experiments (DOE), Six-sigma Fundamentals and Applications, and Applied Multivariate Statistical Modeling. A 42 lecture series on "Applied Multivariate Statistical Modeling" of Prof Maiti is available in Youtube uploaded by NPTEL (national programme on technology enhanced learning). Prof Maiti has been serving the editorial board member of several international journals of repute. Presently he is the editorial board member of Safety Science published by Elsevier Science, International Journal of Injury Control and Safety Promotion, published from Taylor & Francis, and Safety and Health at Work (SHAW) published by Elsevier Science

## COURSE PLAN :

**Week 1:** Basics of safety and risk:

**Week 2:** Creation of safety database:

**Week 3:** Safety data quality assessment and preprocessing

**Week 4:** Descriptive safety analytics

**Week 5:** Safety performance evaluation and monitoring

**Week 6:** Analysis of Safety Reports and Narratives

**Week 7:** Risk quantification

**Week 8:** Predictive safety analytics

**Week 9:** Predictive risk analytics

**Week 10:** Predictive risk analytics

**Week 11:** Prescriptive safety analytics (contd.)

**Week 12:** Behavioral safety analytics and injury epidemiology