INDUSTRIAL SAFETY ENGINEERING

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IIT Kharagpur

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

COURSE OUTLINE

Safety is one of the key dimensions of engineering asset management. Safety by design or prevention through design is in the core for maintaining engineering systems safe. The objective of this course is to impart knowledge on different facets and aspects of engineering systems safety, focusing on tools, techniques and methodologies needed for prevention of occurrences of unsafe operations and accidents under different industrial settings. Upon completion of the course, the students will be equipped with concepts of engineering systems safety, dimensions of engineering systems safety, safety design and analysis mathematics, design for engineering systems safety and control for safety, and integrating safety with other operational goals such as quality and reliability.

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 : Introduction, key concepts, terminologies, and safety quantification, safety by design
Week 2 : Hazard identification techniques (e.g., HAZOP, FMEA, etc.)
Week 3 : Fault tree and event tree analysis (qualitative & quantitative)
Week 4 : Bow-tie and quantitative risk assessment (QRA)
Week 5 : Safety function deployment
Week 6 : Safety vs reliability – quantification of basic events (repair to failure, repair-failure-repair, and combined processes)
Week 7 : Safety vs reliability – quantification of basic events (contd.)
Week 8 : Systems safety quantification (e.g., truth tables, structure functions, minimal cut sets)
Week 9 : Human error analysis and safety
Week 10 : Accident investigation and analysis
Week 11 : Application of virtual reality
Week 12 : OSHAS 18001 and OSHMS