

Course Type	Course Code	Name of Course	L	T	P	Credit
DE6	MND 405	MINE SAFETY ENGINEERING	3	0	0	9

Course Objective

The 'Mine Safety Engineering' as elective paper has been designed and aimed at comprehensive understanding of philosophy of safety engineering approach at mines to achieve target production with no or insignificant accident cost which is very important for Indian mining industry to survive in the competitive global market. Hence, the course is designed to cover the general aspects of risk based industrial safety engineering applicable to mining.

Learning Outcomes

The proposed syllabus will enable the students to have a comprehensive understanding of the safety engineering approach and its application in mines through the hazards identification techniques, estimation & evaluation techniques of risk, controlling techniques, communication and review methodologies. The latest and modern concepts of risk-based safety management have been incorporated in the syllabus with focus on accident prevention, which is the primary requirement of any workplace. Incorporation of Ergonomics and Work study is also very important workplace design in respect to the body dimension and workload capacity of the mine workers/equipment operators. The curriculum will provide the entire spectrum of industrial safety engineering to build confidence in the students to efficiently handle the safety issues at different domain within the mining system.

Sl. No.	Major Topics	No. of Lectures	Learning outcomes
1	Introduction Historical Developments of Mine Safety in India and Abroad; Need for Approving Safety Engineering Approach in Mining Industry; Engineering Safety Goals; Mine Safety Facts and Figures; Worldwide Major Mine Disasters.	4	This unit will help students to understand the historical developments of mine safety in India and abroad as well as basics of safety engineering approach in mining supported with worldwide Safety Facts and Figures.
2	Risk Management Risk Management Related Terms and Definitions; Basic Concept of Risk, Reliability and Hazard Potential; Risk Components and Types; Risk Management Objectives; Risk Management Process; Functions of a Risk Manager; Common Errors in Risk Management; Risk Estimates for Selective Events; Hazards Identification and Risk Assessment (HIRA) Methodology; Implementation of HIRA and its Controls & Review; Advantages of Risk Management	11	This unit will help the students to learn in detail about risk management - the most important part of safety engineering. This will help the students in understanding the hazards, risk associated with hazards, assessment and evaluation of risk due to the presence of hazards and mitigation & control of risk associated with existing hazards.
3	Statistical Methods of Risk analysis Basic Risk Analysis Methods based on Frequency Rates and Severity of Accidents Appraisal of advanced techniques - Preliminary Hazards Analysis (PHA); Hazards and Operability Analysis (HAZOP); Failure Mode and Effect Analysis (FMEA); Failure Mode Effect and Critical Analysis (FMECA); Job Safety Analysis (JSA); Fault Tree Analysis (FTA); Markov Model (MM) - An Important Risk analysis Tool.	11	This unit will help students in understanding the different qualitative, semi-quantitative, and quantitative methods of risk analysis. Applications of bivariate and multivariate statistical methods in quantitative risk analysis will be cleared in this unit.
4	System Safety Engineering Concept in Mine Safety An Introduction to Systems Safety Engineering; Different School of Thoughts in Accident Causations - Domino Model; Behavioural Accident Model based on the human	7	Learning outcomes from this unit are as follows: 1. understanding the System 2. get to know different school of thoughts in system safety engineering 3. understanding different statistical

[Signature]
31/5/24

D.G. Kishore
31/5/24

[Signature]
31/5/24

[Signature]
31/05/2024
Rue
31/05

Sl. No.	Major Topics	No. of Lectures	Learning outcomes
	perception; Epidemiological Accident Models, Normal Accident Theory; The Swiss Cheese Model; Systems-Theoretic Accident Modeling and Process (STAMP); In-depth Study of Accidents Due to Various Causes; Application of Structural Equation Modelling (SEM) and Artificial Neural Network (ANN) in Determining the Accident Causation in Mines.		modeling in determining the accident causation in mines.
5	Safety audits and control Objectives of safety audit in mines; Different steps in safety audit; Risk control procedures	3	This unit will help the students to learn different steps of safety audit which is important to find out the loopholes during implementation of safety management system. This unit also helps in understanding the different risk control procedures that is required to be applied to manage the risk in a system.
6	Mine Ergonomics Domain, Philosophy and Objective of Mine Ergonomics; Ergonomics/ human Factors fundamentals; Work physiology and stress; Human body- structure and function, anthropometrics; Posture and movement; Posture and Job Relation – Work Posture Analysis using OWAS Method; Oxygen Consumption and Workload Analysis of Mine Workers.	6	This unit will help students in understanding the workplace design in respect to the body dimension and workload capacity of the mine workers/equipment operators
	Total	42	

[Signature]
31/5/24

[Signature]
31/5/24

[Signature]
31/5/24

[Signature]
31-05-2024

[Signature]
31/05