

M.Tech. in SAFETY ENGINEERING & ANALYTICS



Centre of Excellence on Safety Engineering & Analytics (CoE-SEA)
Indian Institute of Technology (IIT) Kharagpur

Brochure for sponsored candidates



About CoE-SEA

The M.Tech program in 'Safety Engineering and Analytics' is offered by the Centre of Excellence on Safety Engineering and Analytics (CoE-SEA), established in July 2020 under the Institute of Eminence (IoE) scheme by Govt. of India at IIT Kharagpur and is offering world-class education, training, consulting and research in safety engineering and management, safety analytics, human factors, VR & AI, risk management, and allied disciplines.

CoE-SEA beside its core competency, derives the competencies from other allied departments and centres to fulfil the objectives.

Objectives

- i. To become global benchmark for safety education, training, consulting & research
- ii. To create national level repository of safety & related data
- iii. To be a continuous source of support to industries & service organizations
- iv. To develop highly qualified human resources for strategic level positions in industries including safety and sustainability
- v. To build in competencies in working professionals through outreach programs and providing seats in the regular MTech program through sponsorship facility.
- vi. To develop & implement industry 4.0/5.0 technologies & solutions for accident prevention
- vii. To develop competencies in data analytics and its application to various data including safety

Key Verticals

- Industrial Safety
- Occupational Safety & Health
- Process Safety Management
- Mine Safety
- Road Safety
- Fire Safety
- Oil, Gas & Chemical Safety
- Construction Safety
- Electrical Safety
- Rail Safety
- Manufacturing Safety
- Marine Safety
- Aviation Safety
- MSME Safety
- Safety Analytics
- Artificial Intelligence
- Virtual & Augmented Reality
- Situational Awareness & Human Sensing Technologies
- IoT based Smart Safety
- Hazard Identification & Risk Assessment
- Integrated Safety Management
- Prevention through Design (PtD)
- Risk & Uncertainty Analysis
- Behavior Based Safety
- Human Factors & Ergonomics
- Eye Tracking
- Predictive Maintenance
- Risk-based Maintenance
- Operations Safety Economics

Program Overview

*To fulfil the objectives iii and iv, this M.Tech. program will admit **10 sponsored** candidates from the industries and **15 regular** students (through GATE).*

- *Theory classes*
- *Laboratory classes*
- *Thesis/Project work*
- *Industry Internship*
- *Research Exposure*

- Aims to produce qualified human resources equipped with the engineering, analytical, managerial & leadership abilities
- Highly suitable for the operational and strategic positions of organizations in the areas of safety, risk, occupational health, resiliency, sustainability, and analytics.
- Offers a pathway to diverse & high-demand careers
- A flexible curriculum that provides the knowledge & expertise necessary to study the systems, identify the hazards, assess the risk, & recommend the risk control systems to avoid the potential incidents/accidents & to develop resilient systems
- The students will learn to design new models, analyze existing situations, develop key performance indicators, & ensure the technology serves its intended users
- Development of right data using conventional and IoT based analytic techniques from the domains such as operations, maintenance, supply chain, etc. which directly or indirectly effects the safety of people, property and environment.

Course Curriculum

Sponsored students will be doing the internship and project in their work sites

Jul-Nov
(In Campus)

SEMESTER 01

- Process Safety Engineering
- Human Factors Engineering
- Safety Engineering Lab
- Work System Design & Virtual Reality Lab
- Seminar
- Electives – any 3 subjects

Jan-April
(In Campus)

SEMESTER 02

- Occupational Safety Engineering
- Safety & Risk Analytics
- Safety & Risk Analytics Lab
- Project I
- Electives – any 3 subjects

May – April

SEMESTER 03

- Summer Internship (In May & June)
- Project II

SEMESTER 04

- Project III

ELECTIVES

Data Analytics
Decision Modelling
Applied Multivariate Statistical Modelling
Software Engineering & Management
Machine Learning
Machine Learning for Industrial Applications
Natural Language Processing
Systems Modelling & Data Analytics
Game Theory & Applications
Deep Learning Foundations & Applications
Generalized Linear Models & Applications
Dependable & Secure AI-ML
Management Information System
Stochastic Modelling of Business
Recommender Systems in e-Business
Large Scale Optimization
Applied Reinforcement Learning & Optimization
Web Data Analytics with Applications

Safety & Environment
Safety Economics
Fire Safety Engineering
Environmental Impact Assessment
Hazardous Waste Treatment & Management
Road Safety & Management
Industrial Pollution Control
Industrial Hygiene
Safety Legislation & Environmental Law
Disaster Management

Quality & Reliability
Reliability Engineering
Reliability Design
Quality Engineering
Maintenance Engineering
Fault Diagnosis & Predictive Maintenance
Statistical Methods in Reliability
Six Sigma Fundamentals & Applications

Management & Leadership
Project Engineering & Management
Techno-Entrepreneurial Leadership
Total Quality Management
Logistics & Supply Chain Management
Human Resource Systems
Business Economics

Studying elective subjects in addition to the core subjects will help the students gain a broader perspective and acquire a specialized skill that helps them mold a career as a safety professional with additional knowledge of their interest.

The project works will facilitate:

- (i) Students to apply the inputs on safety engineering and analytics (theory, models, experiments, software, analytics, etc.) in the industry
- (ii) Industries can expect some safety related improvements through systematic approach of the latest applications

Why should Industries Sponsor candidates for the M.Tech. in SEA ?

This is the era where fresh students from premiere institutes prefer to build their career in software, analytics, financial sector, banking, research, etc. Now, CoE-SEA provides an opportunity to convert your experienced good and suitable officers into safety function with higher skills and knowledge from the premiere institute.

Value proposition

- Enhanced expertise in safety and allied functions
- Build in competencies in Data Analytics
- Enhanced knowledge in safety management and leadership roles
- Innovation and Continuous Improvement
- Improved risk management
- Competencies in latest safety technologies and techniques
- Employee Retention
- Competitive Advantage



Outcome

The students of the MTech program will acquire not only the requisite knowledge, skills and competencies of SEA but also managerial, decision making, and leadership skills in occupying higher level responsible positions in the safety functions and can also be rotated to other functions.

Types of industries who can sponsor candidates to the course

Seeing the urgency and importance of this program, the following representative list (inexhaustible) of industries may get benefitted from,

- Mining and metal industries such as metal and non-metal mining, iron and steel, and aluminum
- Oil, gas and chemical industries
- Infrastructure and construction sectors
- Defence and space equipment manufacturing and operations industries such as DRDO, Indian Armed Forces, ISRO, etc.
- Manufacturing industries such as automobile, locomotives, and white goods.
- Healthcare industries
- Extended Reality (XR) sector
- Disaster Sustainability risk and insurance

Selection Criteria and Rules for Admission of Industry Sponsored Candidates

- ❖ **At least 60% marks or equivalent CGPA** in Bachelor's degree examination in Engineering or Technology.
- ❖ Should have been in service for **at least a period of 2 years**.
- ❖ Should be on leave to study with full pay for the duration of the course.
- ❖ All sponsored candidates shall be required to **qualify in an interview** by a selection committee to be appointed by the Departmental Academic Committee (PG & R) of the Department/Centre concerned. Shall not apply to the candidates under the Defence sponsorship of the Government of India.
- ❖ Intending sponsored candidates must submit their application online on a prescribed form along with the **sponsorship certificate** duly approved by a competent authority from their employers for admission.
- ❖ Candidates should be officially released from duties for the purpose of joining the course and he/she should draw full pay during their period of study.

Faculty Profiles



Prof. Jhareswar Maiti
Chairman, CoE-SEA

Specialization: Safety Engineering and Analytics, Risk and uncertainty modeling, Data Science, VR & AI



Prof. O B Krishna
Adani Chair Professor, CoE-SEA
Specialization: Mechanical Integrity and Quality Assurance, HAZOP, Prevention through Design, Positive Energy Isolation



Prof. Harshad Hemantrao Shrigondekar
Assistant Professor, CoE-SEA
Specialization: Fire Safety Engineering, Industrial Safety Engineering, Management and Analytics



Prof. Richa Ahuja
Assistant Professor, CoE-SEA
Specialization: Public Transportation, Traffic Management & Safety, Logistics Safety, Transport Resilience & Sustainability



Prof. Laxman Singh Bisht
Assistant Professor, CoE-SEA
Specialization: Road Safety



Prof. Pulak Mishra
Professor
Dept. of Humanities and Social Sciences
Specialization: Industrial Economics



Prof. Bibhuti Bhusan Mandal
Professor
Dept. of Mining Engineering
Specialization: Occupational health and safety, Applied Ergonomics, Noise and vibration control



Prof. Bhim Charan Meikap
Professor
Dept. of Chemical Engineering
Specialization: Industrial Pollution Control, Hazardous Waste Management

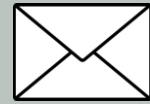


Prof. Sanjay Kumar Chaturvedi
Professor
Subir Chowdhury School of Quality and Reliability (SCSQR)
Specialization: Reliability Engineering

In addition, the program is supported by associated faculty members from different departments of IIT Kharagpur

Industry and Academia collaboration in India and abroad

Reach out to us



Write to:

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Check our website for timely updates:

<http://www.coesea.iitkgp.ac.in/>

