WELCOME YOU ALL

IN THE COURSE

MINE AUTOMATION AND DATA ANALYTICS (MNC305)

INSTRUCTOR

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LECTURE PLAN

MNC 305 - MINE AUTOMATION AND DATA ANALYTICS 3 0 0

MNC 305	MINE AUTOMATION AND DATA ANALYTICS	L	T	P	C
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Course Objective
This course will cover mine automation, as well as data analytics applicable to mining systems.
Learning Outcomes
The students will gain a comprehensive overview of state of the art mining automation, as well as, practical skills in artificial intelligence and other digital technologies used in the mining industries.

Sl. No.	Major Topics	No. of Lectures	Learning outcomes
1	Basic Elements of an Automated System, Automation in Mine Production System, Principles and Strategies of Automation, Introduction to automation productivity. Autonomous mining systems - Autonomous haulage systems, Automated drilling system, Fleet Management System: TDS, CMMS, ERP for Mining Industry, Mining Remote Operations & Control: Robotics & Armchair Mining	10	The automation system in mine production and available system.
2	Automated Communication and Tracking Technologies: Proximity Systems, GNSS/UPS, Radar Systems, RFID and Geo-fencing, CCD camera, Image Processing, SCADA, etc.	8	The sensors and automation tools for implementing automation in mine.
3	Virtual Reality Applications: Mining Equipment Concept development, Mine Safety Applications, Mining operation simulations	6	Visualisation of mining process for safe mine operations.
4	Descriptive Statistics: Probability Distributions and Inferential Statistics: Hypothesis tests, Regression & ANOVA. Machine Learning: Introduction and Concepts.	6	Learning descriptive statistics and machine learning for implementing automation and analytics.
5	Supervised Learning: Neural Networks, Deep learning. Unsupervised Learning and Challenges for Big Data Analytics: Clustering.	6	Develop understanding on supervised learning and deep learning algorithm to analyze big data for decision making.

6	Application of Big Data Analytics and Artificial Intelligence (AI) in Mining; Use Case studies on Cognitive Maintenance, Ore body modelling and Mine Design etc.	6	Application of Big Data and AI in Mining

Reference Books

1) Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2) Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010
3) G. Almgren, U. Kumar, N. Vagenas : Mine Mechanization & Automation 1st Edition
4) J. O'Shea M. Polis: Automation in Mining, Mineral and Metal Processing (1st Edition), Proceedings of The 3Rd Ifac Symposium, Montreal, Canada 18-20 August 1980
5) João Moreira, Andre Carvalho, Tomás Horvath: A General Introduction to Data Analytics, Wiley, 2019
6) Thomas A. Runkler, Data Analytics: Models and Algorithms for Intelligent Data Analysis, Vieweg+Teubner Verlag, 2012

Evaluation System

Mid-Semester = 30
End-Semester = 50

Class test = 20 (Two class tests will be taken, one before the mid-sem and another before the end of the semester.)