Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	NMNC527	Computer Aided Mine Planning and Design	3	1	0	4

Course Objective

- This course deals with the principles, processes and methodologies associated with mine planning & design of surface and below ground mining operations through 3D modeling using available computer software.
- The course will expose the students of mining engineering at postgraduate level with concepts of planning and design of surface and underground mining mutually applicable to coal and metalliferous deposits.
- In the practical associated with this course, the students will be introduced to computer applications and mathematical algorithm associated with the mine planning and design.

Learning Outcomes

Upon successful completion of this course, students will understand:

- The basic input requires for mine planning, Surface mine planning and scheduling, Underground metal and coal mine planning, Mine closure and feasibility report preparation using computer software

Units	Course Content	L+T	Learning Outcomes
Unit 1	Introduction: Mine planning process, component of mine planning. Exploration strategy and planning, exploratory drilling, management of exploration data, Concept of cut-off grade, compositing, resource estimation techniques, resource classification system-UNFC.	5L+1T	Students will learn the exploration techniques, and reserve estimation
Unit 2	Applications of CAD systems in mine design, Surface modelling concepts Introduction to various mine planning software	3L+1T	Students will be aware about mine planning software
Unit 3	Surface Mining System: Pit geometry, stripping ratios and their significance, Pit layouts, pit expansion and push back, Ultimate pit configuration, Production scheduling	4L	Students will be exposed to various surface mining systems
Unit 4	Underground metal and coal mining system: Classification of methods and factors governing choice of mining methods	5L	Students will learn metal and coal mining methods
Unit 5	Data Representation and Processing Tools: Understanding data representation and processing tools, File tools, String concept, String file handling, Data import & export	4L+2T	Students will learn point, string creation, area calculation
Unit 6	Database Management: Database management and Geological modelling, Reduction of data into presentable form, Drill hole visualization, Creation of Digital Terrain Models, DTM	5L+3T	Student will learn database creation and visualization, 3D modelling

	Volume calculations, Contouring, Auto-plotting, Sectioning a DTM, Solid Models, Compositing.		
Unit 7	Resource Estimation & Computing: Variogram modelling and Resource estimation using Mine Planning Software, Block modelling	5L+3T	Students will learn block modelling and resource estimation
Unit 8	Pit design and optimization, Mine Scheduling	4L+2T	Student will learn pit design and scheduling
Unit 9	Computer Aided Underground Mine Design	3L+2T	Student will learn underground mine design
Unit 10	Planning for mine closure: Lease agreements, surface facilities, underground facilities, water management, site rehabilitation, socio economics	2L	Students will learn the mine closure planning
Unit 11	Feasibility assessment and Report preparation	2L	Students will learn the contents of a feasibility report and case study
	Total	**42L+14T**	

Textbooks:

1) Open Pit Mine Planning and Design-W. Hustrulid and M. Kuchta, Taylor & Francis
2) SME Mining Engineering Handbook-H.L. Hartman, Society for Mining, Metallurgy, and Exploration

Reference Books:

1) Surface and underground excavations – R. R. Tatiya
2) Principles and practices of modern coal mine-R. D. Singh
3) Mineral Deposit Evaluation: A practical approach by Alwyn E. Annels