Winter semester

Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	NMNC515	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 and the associated basic economics.
- 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, Basic economics for mineral valuation, Surface mine planning and scheduling, Underground coal and metal mine planning, Mine closure and feasibility report preparation.

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+2T	Students will learn the exploration techniques, and reserve estimation
Unit 2	Mine valuation: Basic concept, recent approaches to valuation; Time value of money Price information – revenue estimates, taxes, accounting profits and cash flows.	4L+2T	Students will learn the basic economics involve in mine planning
Unit 3	Surface Mining System: Pit geometry, stripping ratios and their significance, Pit layouts, pit expansion and push back, Ultimate pit configuration, Production scheduling	5L+2T	Students will be exposed to various surface mining systems
Unit 4	Underground coal mining system: Classification of methods and factors governing choice of mining methods, Pillar mining systems: Design, development, manpower, coal handling, equipment, essential services, production scheduling, time and work study for improvement of production, Optimization of mine size (mine production capacity) based on techno-economic considerations, Equipment and face scheduling against targeted production, Longwall mining System: layouts for thin and medium thick seams, design, development,	12L+3T	Students will learn production planning using pillar mining system and longwall mining system

	manpower, coal handling, equipment, essential services, production scheduling, time and work study for improvement of production, Optimization of mine size based on techno-economic considerations, Equipment and face scheduling against targeted production, Planning and design for contiguous seams, hydraulic mining, other applicable methods		
Unit 5	Underground Metal Mining System General engineering design; design methods in mining; input parameter for design - geological and other rock mass parameters; empirical, observational and analytical methods of design; design of excavations in massive elastic, stratified and jointed rocks. Stope planning: Evaluate stope boundaries, selection of a stoping methods, Design of stoping layouts for mining of different types of ore deposits and application of computer in stope design, economics of each stope. Production planning: Stope reserve, development, manpower, ore/waste handling, equipment, essential services, production scheduling, time and work study for improvement of production, Optimization of mine size (mine production capacity) based on techno-economic considerations. Planning and design for deep deposit, hydraulic, thermal, hydro-chemical and biochemical methods, and nuclear device mining systems.	12L+3T	Students will learn underground metal mine planning considering various geological constraints
Unit 6	Planning for mine closure: Lease agreements, surface facilities, underground facilities, water management, site rehabilitation, socio economics	2L+1T	Students will learn the mine closure planning
Unit 7	Feasibility assessment and Report preparation	2L+1T	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