

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

**COURSE TITLE: MINE SAMPLING, ASSAYING AND MINERAL DRESSING
(Code: 3342205)**

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	4 th Semester

1. RATIONALE:

The mining engineers are responsible for locating mineral rich area by sampling, exploration; these operations include mineral sampling, calculation of grade values, calculation of ore reserves, analysis of samples, and concentration of mineral applying various ore beneficiation techniques. This course attempts to develop these skills in students and hence content of this course includes basic concepts, various methods of ore beneficiation of different mineral resources. Thus this course prepares students for the mining and metallurgical industry.

2. COMPETENCY:

The course content should be taught and curriculum should be implemented with the aim to develop different types of skills so that student is able to acquire following competency.

- **Extract ores and minerals economically by applying, knowledge and skills of sampling, assaying, mineral dressing and ore beneficiation.**

3. COURSE OUTCOMES (Cos)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Select appropriate method of sampling for given rock formation and their distribution
- Estimate ore reserves for a given situation
- Describe mineral dressing methods for different type of minerals.
- Explain the coal beneficiation methods

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
4	0	2	6	70	30	20	30	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Mine Sampling	1.a Describe the concept of sampling and related Terms. 1.b Explain various operations related with sampling and salting like transportation, reduction, Preservation, etc.	1.1 Definition, associated terms, purpose and various uses of sampling. 1.2 Sampling Methods with their applicability conditions. 1.3 Salting-purpose, safety against salting. 1.4 Methods of Reduction of sampling.
Unit – II Assaying	2.a Calculate ore reserves and grade values for a given situation.	2.1 Introduction - assay map, assay plan factor, assay values, grade value, tenar, Type of grade value. 2.2 Calculations based on average assay Value. 2.3 Estimation of ore reserves.
Unit – III Mineral Dressing	3a. Use various mineral concentration operations such as size reduction, screening, stratification, floatation etc. 3b. Describe concentration of different minerals in flow sheet.	3.1 Scope, objectives & limitations of Mineral Dressing. 3.2 Comminution. 3.3 Size separation. 3.4 Gravity concentration methods. 3.5 Froth floatation. 3.6 Simplified flow sheets of copper, Lead & zinc, iron, limestones.
Unit – IV Coal Benefication Methods	4.a Draw a flow sheet of coal washing plant. 4.b Compare washing of coal with other minerals.	4.1 Flow sheet of coal washing plant. 4.2 Coal washing plant-feature, advantage and purposes. 4.3 Flow sheet of coal washing with other minerals.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Mine Sampling	10	05	02	03	10
II	Assaying	18	10	07	08	25
III	Mineral Dressing	22	12	05	08	25
IV	Coal Benefication Methods (Briefly)	06	05	02	03	10
Total		56	32	16	22	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

7. SUGGESTED LIST OF EXERCISES/PRACTICAL:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies / programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes

S. No.	Unit No.	Practical/Exercise (Outcomes in Psychomotor Domain)	Approx. Hrs. Required
1	I	Collect samples from different places using various methods.	04
2	II	Demonstrate constructional features of jaw crusher.	02
3	III	Perform grinding operation by ball mill.	06
4	III	Separate different types of minerals by froth floatation process.	04
5	III	Sort various mineral by Gravity concentration method.	04
6	III	Separate magnetic mineral by magnetic separation method.	04
7	IV	Draw flow sheet for a concentration process of any mineral industries visited by you.	04
Total Hours			28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Collect samples from different places by using various methods and perform reduction operation according to the laboratory parameter.
- ii. Students should calculate the mineral reserves at different location and prepare a report using various ore-reserve calculation methods.

9. SPECIAL INSTRUCTION STRATEGIES (IF Any)

- i. Pictures of mineral dressing activities.
- ii. Videos of ore dressing operation.
- iii. Group discussion.
- iv. Internet based assignments.
- v. Demonstration on models.

10. SUGGESTED LEARNING RESOURCES**A. List of Books:**

S. No.	Title of Books	Author	Publication
1	Mineral dressing	Gaudin	Lovely prakashan
2	Mine economics	Sinha & Sharma	Lovely prakashan
3	Element of mining	D.J.Deshmukh	Central Techno publication
4	U.M.S.		Lovely prakashan
5	Mine economics	A.Kumar	Lovely prakashan

B. List of Major Equipment/Materials

- i. Jaw crusher.
- ii. Ball mill.
- iii. Rod mill.
- iv. Various type of industrial screen.
- v. Froth floatation chamber.
- vi. Magnetic separator.
- vii. Jigging machines.

C. List of Software/Learning Websites

- i. Wikipedia
- ii. www.nptel.com

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. S.G. Srivastav**, I/c HOD, Department of Mining Engineering G.P.Bhuj
- **Prof. R.G. Prajapati**, Lecturer, Department of Mining Engineering G.P.Bhuj

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K .K Jain**, Professor and Dean, Department of Mechanical Engineering.
- **Dr. C. K. Chug**, Professor Department of Mechanical Engineering.