COURSE SYLLABUS

MIN 401: Coal Processing Plant Design
Missouri University of Science and Technology
Department of Mining and Nuclear Engineering

3 Credit Hours  Instructor: Dr. Ahmed Sobhy
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Course Description: Design a coal preparation plant by integrating unit operations proceeded by certain back-up laboratory experiments.

Prerequisites: 300 Level Mineral Processing Course or equivalent; engineering standing.

Course Goals: Upon completion of the course, students will possess the knowledge needed to design a coal preparation that ensures maximum profitability for a mining company while achieving the required product quality specifications. Students will understand the methodology used to select the appropriate unit operations, predict their respective performances, determine the optimum operating conditions and select the required size of the unit. A knowledge of product quality assurance programs that includes the monitoring of plant efficiency will be demonstrated.

Textbooks: Course Notes


Learning Outcomes: (Undergraduate and Graduate Students)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Implementation Strategy</th>
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<tbody>
<tr>
<td>1. Design a screening system to treat a given feed material and flow rate.</td>
<td>Exam, Homework, Project</td>
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<td>2. Predict the oversize and undersize particles size distributions of a screen.</td>
<td>Exam, Homework, Project</td>
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<td>3. Design a classifying cyclone circuit to achieve a desired particle size separation and predict particle size distributions of product streams.</td>
<td>Exam, Homework,</td>
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4. Evaluate the density-based cleaning characteristics of a given coal using washability analysis data.

5. Predict the separation performance for a density-based separator using measured or known efficiency data.

6. Design density-based separation circuits for different applications

7. Understand the basic operating characteristics of dense-medium separators.

8. Optimize the operating parameters of a coal preparation plant.

9. Design a froth flotation system for the treatment of fine coal.

10. Select appropriate dewatering devices and application of design parameters.

11. Develop a preparation plant flow sheet and provide mass and volumetric flow balances.

12. Improve communication skills.

Course Topics:

1. Coal Characterization
2. Metallurgical Accounting
3. Classification
   a. Screens
   b. Hydrocyclones
4. Gravity Separators
   a. Washability Analysis
   b. Coarse and Fine Coal Processes
   c. Performance Simulation and Evaluation
5. Froth Flotation
   a. Conventional Flotation
   b. Column Flotation
6. Dewatering
   a. Filtration
   b. Centrifuges
7. Clarification
8. Plant Optimization

Course Projects:

Coal Preparation Plant Design

Course Grading:

<table>
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<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Exam 1</td>
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<td>Exam 2</td>
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<tr>
<td>Final Exam</td>
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<td>Homework Assignments</td>
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<tr>
<td>Project</td>
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