Course: **MinE 484 (W) - Mine Design - Report**

Semester: Spring 2015

Course Format
And Credit Hours: 4 hr Lecture/Laboratory

Prerequisites: MinE 483

Instructor: Dr. Keith A. Heasley, 359H Mineral Resources Building
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Schedule: Tue., Thur. 9:00 – 10:45

Location: MRB 243/ESB G78B

Office Hours: Open Door Policy or by appointment

Course Objectives: The objectives of this course are to integrate the engineering concepts and design procedures studied in other courses into a comprehensive mine plan based on the geologic, quality, and demographic features of the coal or mineral reserve area mapped during the previous semester. Socio-economic and environmental issues will be addressed. At least one field trip to a mining facility is planned. This feasibility study will be reported in both a written form and an oral presentation. The report will include all significant engineering tasks required to demonstrate the technical and economic features of the project. Written sections of the report will be completed in stages throughout the course, so as to fulfill the requirements for a GEC writing (W) course. Communication of the final mining engineering feasibility study results and assumptions is critical to an appropriate management decision. A final oral presentation of the student's work will be held at the end of the semester.

Expected Learning Outcomes:

By the end of the course, students will be able to:

1. Design an appropriate mine layout to extract the target mineral.
2. Specify appropriate mining equipment for a desired extraction method and rate.
3. Design the ground control aspects of a mine including: entry width, pillar sizes, bolting plan, slope stability, etc.
4. Design the ventilation system for the mine including: air quantities, number of entries, shaft/slope sizes, fan sizes, etc.
5. Design an appropriate blasting plan.
6. Design the power system, belt system, truck haulage system and water systems for a mine
7. Design an appropriate processing plant for a given mineral and production rate.

8. Design appropriate mine waste disposal systems.
9. Design surface support facilities (bathhouses, shops, etc.) for a mine.
10. Specify the permitting requirements for a mine.
11. Design a schedule for the mine development and production.
12. Specify personnel requirements for a given mine
13. Specify the capital and operating costs for a given mining operation
14. Develop the economic analysis for a mining project
15. Work as a team member on a long, involved project.
16. Development numerous written technical reports on the engineering design
17. Review and re-write technical documents for completeness, conciseness and clarity
18. Develop and present a technical project presentation

Required Texts: Provided in previous courses.

Grading:

11 Written Technical Design Reports	65%
Final Project	20%
Final Presentation	15%

Grade Assignment:

100 – 90	A
89 – 80	B
79 – 70	C
69 – 60	D
59 - 0	F

Grading Policy: This class consists of numerous written reports that build upon each other; therefore, it is critical that the student keep up with the writing schedule. Late assignments are docked 10% per day, or part of a day, that they are late. Project grading appeals most be submitted in writing on the day the exam or project is returned.

HW Assignments: Homework assignments will be given approximately every week or two, and each assignment will be worth approximately the same credit. The sum of the homework assignments will be worth 65% of the class grade.

Final Project: The final team design project will be the accumulation of the individual writing assignments given throughout the term. The final project is expected to be presented as a formal technical report format with appropriate front section, headings, tabs, references, etc. The final report will be due during dead week and will be worth 20% of the final grade.

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations or quizzes because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams or quizzes for absences due to any other reason will be at the discretion of the instructor.

Team work: The instructor initially approve teams. Team members are expected to share the work assignments equally over the semester and collaborate on learning how to use the mapping and geologic modeling software. Teams may be modified or dissolved if lack of teamwork is demonstrated. One grade is generally given for the team unless, in unusual circumstances due to lack of participation by one team member, different grades are warranted. A team work assessment will be taken at the end of the term to help determine appropriate teamwork grades.

Professional Registration: As part of the academic and professional development of young mining engineers, the Mining Engineering Department strongly encourages student to take the Fundamentals of Engineering (FE) exam and to then follow this by becoming registered as a Professional Engineer (PE).

Social Justice Statement: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).

Days of Special Concern: WVU recognizes the diversity of its students and the needs of those who wish to be absent from class to participate in Days of Special Concern, which are listed in the Schedule of Courses. Students should notify their instructors by the end of the second week of classes or prior to the first Day of Special Concern, whichever is earlier, regarding Day of Special Concern observances that will affect their attendance. Further, students must abide by the attendance policy of their instructors as stated on their syllabi. Faculty will make reasonable accommodation for tests or field trips that a student misses as a result of observing a Day of Special Concern.

Course Schedule:

Week Topic

1. Review: syllabus, workplan, report review sheet.
   Discuss: course website, teamwork, group organization, report format.
   Lecture: feasibility study, mine plan layout, equipment selection, ground control design.
   Assignment: write project scope, review papers on feasibility studies and due diligence.
2. Review: exploration report for technical writing comments
   Discuss: reserves vs. resources.
   Lecture: ventilation design, creating and timing a mine plan in SurvCADD.
   Assignment: write draft sections on mine plan, equipment, ground control and ventilation
3. Lecture: belt design, fresh water and waste water pumping.
   Assignment: write draft sections on mine plan, equipment timing and forecast production
4. Lecture: mine power design, truck-shovel haulage design and blast design
   Assignment: write draft sections on belt design, haulage, blasting, pumping and power.
5. Open
6. Lecture: surface facilities, material handling, refuse disposal and preparation plant
   Assignment: rewrite final versions of previous draft reports
7. Lecture: permitting, development schedule, marketing, and safety
   Assignment: write draft sections on: surface facilities, material handling, refuse disposal, prep plant, permitting, mine development schedule, marketing and safety
8. Lecture: manpower requirements and operating expenses.
9. Lecture: capital requirements, taxation, depreciation, depletion, cash flow analysis
   Assignment: write draft sections on workforce and operating cost estimates.
10. Assignment: write draft sections on capital requirements and cash flow analysis
11. Assignment: rewrite final versions of previous draft reports
12. Lecture: writing an executive summary, presenting a technical report
    Assignment: finalize exploration sections, Prepare oral presentation
13. Lecture: technical report format, conclusions, recommendations, appendices
    Assignment: write final report sections
14. Open
15. Assignment: Present oral presentation
16. Assignment: Present oral presentation
17. Assignment: Final Report Due

Writing Component and Schedule of Writing Activities:

Students will complete five related writing assignments of multiple sections and one oral presentation over the course of the semester. The course maybe completed as an individual or team (2-3 people). Three of the writing assignments will be individual papers, while two will be the draft and final report of the group project. An approximate breakdown of each assignment is described below. A minimum of 40-60 pages of written material is required over the semester. The writing assignments are not in the order of the report because the draft Paper C was prepared in MinE 483 and is not needed until the mine plan is completed.

Paper A: (Weeks 1-5) – Paper A contains the sections: Ground Control, Ventilation, Equipment and Mine Plan from Assignment #2; Equipment Timing, Forecast Production from Assignment #3, and Belt Design, Haulage, Blasting, Pumping, and Electric Power from Assignment #4. Each of these individual sections should take approximately 6-10 pages to cover appropriately. It is required that each of the (2-3) students in the group will individually write their share (3-5 sections) of the total 9 sections in Paper A. As the individual sections are returned as part of the weekly assignments, they will be reviewed by the instructor and returned with feedback on content, completeness, and consistency. Once all of the individual assignments have been returned, the students will have a minimum of one week to edit the assignments and return for a final grade of the Paper A compilation.

Paper B: (Weeks 6-11) – Paper B contains the sections: Surface Facilities, Material Handling, Preparation Plant and Refuse Disposal Plan from Assignment #5; Permitting, Mine Development, Marketing and Safety from Assignment #6; Manpower and Operating Costs from Assignment #7; and Capital, Depreciation, Depletion, Cash Flow and Economic Analysis from Assignment #8. Each of these individual sections should take approximately 6-10 pages to cover appropriately. It is required that each of the (2-3) students in the group will individually write their share (4-7 sections) of the total 14 sections in Paper B. As the individual sections are returned as part of the weekly assignments, they will be reviewed by the instructor and returned with feedback on content, completeness, and consistency. Once all of the individual assignments have been returned, the students will have a minimum of one week to edit the assignments and return for a final grade of the Paper B compilation.

Paper C: (Week 12) – Paper C contains the sections: Introduction, Location, Geology, Reserves and Quality from the previous exploration report completed in MinE 483. Students will revise and adapt the exploration report from the coal or mineral resource as mapped in MinE 483 for the feasibility study (20-30 pages). Each student, who acted as primary author for the original section will edit a different section and adapt it for the final report incorporating any new knowledge gained during this terms mine design process.

Paper D: (Week 14) – Paper D contains the sections: Conclusions, Recommendations, Executive Summary, Assumptions, References, and Appendices. Students will work as a team to write the draft of these critical sections that need to be very concise and well written (total 6-10 pages). The sections of Paper D will be reviewed by the instructor and returned with feedback on content, completeness, and consistency. Also, at this time, each student will be required to peer-review a draft section(s) of other students' written work completed for Paper B.

Paper E: (Weeks 14-15) – Paper E is the final report in final format including all of Papers A, B, C and D. (This paper serves as the revision of the draft report submitted in Paper D.) Students will correct previous deficiencies and make sure each section is written in a consistent style, content and organization. Exhibits and maps should be in final form. A letter of transmittal and table of contents are required. It is important that the report sections written by different students be integrated together and written in a single "voice" for clarity and readability. Consistent organization, style grammar and spelling are essential characteristics of all well-presented reports.

Oral Presentation: (Week 15) – Students will create a visual and oral presentation of their mine plan and preliminary feasibility study and present it to the class, instructors and guests. The presentation will cover the significant aspects of their work for the semester. Time for the presentation is expected to take no more than 30 minutes, plus questions. It is STRONGLY recommended that the students practice their presentation with the same techniques that they plan to use in their formal presentation.

Indication of How Writing is Related to Objectives

The writing component for this class is directly related to the objective of this course since communicating the results of an engineering feasibility study is critical to the success of the engineer and enterprise. The purposes of the writing assignments are to provide students with experience in: (1) selecting and critically summarizing relevant information from the mining, geologic and geographic literature, (2) detailing engineering assumptions and recommendations in written form, (3) self and peer evaluation of similar project reports, and (4) integrating basic mining and geological science concepts with applied economic analysis through written reports and an executive summary.

Description of Methods Used to Review Writing Assignments

This course has primary faculty, guests and teaching assistants. Faculty and Teaching Assistants will be responsible for course instruction as well as for grading individual writing assignments. Faculty will be responsible for grading second draft papers as well as the final reports.