MinE 484(W) – Mine Design – Report

Spring Semester, 2021, 4 credit hours

Tuesday & Thursday, Room 231 MRB
Section 1 CRN 11181 - 9:50 a.m. – 11:20 a.m., **Section 2** CRN 18618 – 1:00 p.m. – 2:40 p.m.

Instructor: Dr. Dan Alexander, P.E., SME-RM
Room 359E MRB
Mining Engineering Department, CEMR, WVU
(724) 554-8065, e-mail: dalexan1@mail.wvu.edu; alex18ander@gmail.com

Office Hours: Open Door Policy, Tuesday/Thursday/Friday, 3 pm to 4:30 pm or by appointment

Prerequisites: MinE 483

Recommended Text: William Strunk, Jr. & E. B. White, The Elements of Style, 4th Ed., (New York: Allyn & Bacon, 2000). ISBN 0-205-31342-6.

References: AutoCAD and SurvCADD tutorials and user support materials.
Hartman, H. L., SME Mining Engineering Handbook, Sr. Ed., Vols. 1 & 2 (Littleton, CO: SME, 1992), 2260 pages.
Lowrie, R. L., SME Mining Reference Handbook, Ed. (Littleton, CO: SME, 2002), 448 pages.
Bise, C. J., Mining Engineering Analysis, 2nd Edition, (Littleton, CO: SME, 2003), 313 pages.

Introduction: The objectives of this course are to integrate the engineering concepts, mining knowledge, and design procedures studied in other courses into a comprehensive mine plan based on the geologic, grade or quality, and demographic features of the coal or mineral resource area mapped during the previous semester. Engineering standards and multiple constraints such as Socio-economic, health & safety, and environmental issues will be addressed. At least one field trip to a mining facility is planned under normal circumstances.
This major engineering design experience or pre-feasibility study will be reported in both a written form and an oral presentation. The report will include all significant engineering design 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. Each student will practice clear communication of the engineering assumptions and results.

Expected Learning Outcomes:

By the end of the course, students will have experience doing the following:

1. Incorporate health and safety considerations for workers and the public in all aspects of a mine plan
2. Evaluate several mining methods and design an appropriate mine layout to extract the target coal or mineral deposit.
3. Specify appropriate mining equipment for a desired extraction method and rate.
4. Design the ground control aspects of a mine including: entry width, pillar sizes, bolting plan, slope stability, impoundment dam, etc.
5. Design the ventilation system for the mine including: air quantities, number of entries, shaft/slope sizes, fan sizes, explosive fume dissipation, etc.
6. Design an appropriate blasting fragmentation and monitoring plan, if required.
7. Specify the mine utilities such as: power system, communications, belt system, truck haulage system and water systems.
8. Design an appropriate material handling and processing plant for a given coal/mineral and production rate.
9. Design appropriate mine waste disposal systems.
10. Select surface support facilities (bathhouses, shops, etc.) for a mine.
11. Specify the permitting requirements for the mine.
12. Create a schedule for the mine planning, development, production, and closure.
13. Specify personnel requirements and training for the project.
14. Select appropriate capital and operating costs for the mining operation
15. Develop the economic analysis for a mining project including selection of a supportable sales price and discount rate.
16. Work as a team member on a long, involved project.
17. Development numerous written technical reports on the engineering design.
18. Review and re-write technical documents for completeness, conciseness and clarity.
19. Develop and present a technical project presentation.

Course Details

Grading:	Grade %
Written Technical Design Reports	65%
Final Project	20%
Final Presentation	15%

Grade Assignment:	Letter Grade
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 class that they are late. Project grading appeals must be submitted in writing within 2 days of the when the exam or project component is returned.

If the final report is not completed, the student cannot pass the course and will receive a failing grade.

Graded material will not be kept longer than one semester after the course is completed. (However, MinE 484 reports will be archived.)

Assignments: Assignments must be submitted on the due date to avoid falling behind. Faculty will return mapping and writing assignments with comments asap within the following two weeks. Students have the option of revising the assignment for regrading if submitted on time. All copies of drafts with comments on them must be submitted with any revision.

Any assignments submitted late will receive a 10% discount, compounded by each class meeting that elapses beyond the due date. All assignments should be revised based on comments but may not be eligible for an improved grade if submitted late.

Assignments containing spelling or grammatical errors in excess of one per page will be returned ungraded, the 10% discount for late submission will be applied, and the assignment will not be eligible for an improved grade. Use spell check and proofread for logical or typographical errors and proper use of the English language. Ask another person to listen or read your work as they may find errors you miss.

Final Project: The final team design project will be the accumulation of the revised individual writing assignments given throughout the term. The final project report must be formatted as a formal technical report 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.

Team work: The instructor initially approves members of each team. Team members are expected to share the work assignments equally over the semester and collaborate on learning how to use the mapping, geologic modeling, and mine planning software. All team members are responsible for the entire project, therefore each student should read and understand all work by teammates which also insures that the final report has no contradictions.

One grade is generally given for all members of the team unless different grades are warranted in unusual circumstances due to lack of participation by one or more team member(s). A team work assessment will be taken at

the mid-point and at the end of the term to help determine appropriate teamwork grades. Teams may be modified or dissolved if lack of teamwork is demonstrated.

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 for absences due to any other reason will be at the discretion of the instructor.

Course Materials: All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other materials provided to students for this course are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the Campus Student Code.

Professional Registration: As part of the academic and professional development of new 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).

Institutional Policies: Students are responsible for reviewing policies on inclusivity, academic integrity, incompletes, sale of course materials, sexual misconduct, adverse weather, as well as the student evaluation of instruction, and days of special concern/religious holiday statements, located at: WVU syllabus policies and statements.

Plagiarism: There are no excuses for plagiarism on material presented in the mapping or written assignments. Always credit your sources with citations. Short quotes from reference material are acceptable if the source is noted. Only a project team member may write the report text and all team members are responsible for the entire report.

Cell Phones: Cell phones are an important tool used to search for information and communicate. However, cell phones may not be used during in-person class lectures. Furthermore, your phone (and any other personal electronic device with the exception of laptop computers) should not be visible at any point during class lectures. The use of cell phones during the class lectures will not be tolerated and you will be asked to leave the class immediately.

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 may be completed as an individual or

team (2-4 people). It is required that each of the (2-4) team members will individually write their share of the topics. The team must manage their workload fairly and regularly report progress. 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. Since each mine plan is unique, the list of topics covered in each assignment below may not be exhaustive; the team must decide what topics are material to the preliminary feasibility study level of project analysis. The first draft of Paper C was prepared in MinE 483 and may not be updated until the mine plan and surface layout are completed. A minimum of 40-60 pages of written material plus exhibits and maps are required over the semester. Special arrangements may be necessary for reporting or keeping proprietary data confidential.

Week 1 – Complete a combined RACI and Gantt Chart for the project schedule by assigning each topic to members of the team.

Paper A: (Due Week 5) - Paper A contains the sections: Mine Plan & Production Forecast, Project & Mine Development Schedule draft, Ground Control, Ventilation and/or Blasting, Equipment selection, Haulage & Hoisting, Material Handling, Electric Power and fuel, and water controls. As the individual sections are submitted, they will be reviewed by the instructor and returned with feedback on a) writing style, grammar, and spelling and b) technical content, completeness, and consistency. It is a team decision whether to submit individual draft sections for review before Paper A. Teams must submit Paper A on time.

Paper B: (Due Week 10) - Paper B contains the sections: Processing Plant, Refuse or Tailings Disposal Plan Surface Facilities, Permitting, Marketing, Personnel Required, Safety & Health, Operating and Capital Cost, Depreciation, Depletion, Cash Flow and Economic Analysis. As the individual sections are handed in, they will be reviewed by the instructor and returned with feedback on a) writing style, grammar, and spelling and b) technical content, completeness, and consistency. It is a team decision whether to submit individual draft sections for review before Paper B. Teams must submit Paper B on time.

Paper C: (Due Week 12) – Paper C contains the Mine483 revised sections: Introduction, Location, Geology, Resources and Quality. 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 term's mine design process. Maps must add the mine plan projections and surface facilities to orient the reader. Revisions of papers A & B may be included for a re-grade if the team has completed this work and multiple members have proofread the material.

Paper D: (Due Week 14) – Paper D contains the new sections: Conclusions, Recommendations, Executive Summary, Assumptions, References, and Appendices and all sections of papers A, B, & C. Students will work as a team to write the draft of these critical sections that need to be very concise, consistent with the other parts of the report, and well written. The sections of Paper D will be reviewed by the instructor and returned with feedback on content, completeness, and consistency.

Paper E: (Week 15) – Paper E is the finished report in final format including all of Papers A, B,

C and 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. Both an electronic and a paper copy of the report are required.

Oral Presentation: (Week 15) – Students will create a visual and oral presentation of their mine plan and preliminary feasibility study as a presentation 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 and all students on the team will participate in the presentation. 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 communication objective of this course since communicating the results of an engineering feasibility study is critical to the success of the engineer and enterprise. The purpose of the writing assignments is to provide students with experience in: (1) selecting and critically summarizing relevant information from the mining, geologic and geographic literature, (2) detailing engineering assumptions, conclusions, 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. Guests will participate in evaluating the oral presentations.