

**SYLLABUS**  
**MinE 407 – Longwall Mining**  
**(Elective Course)**

**Description:** Elements of longwall mining including panel layout and design consideration, strata mechanics, powered supports, coal cutting by shearer or plow, conveyor transportation, and face move.

**Instructor:** Brijes Mishra, 359E Mineral Resources Building  
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**Prerequisites:** MinE 205 – Underground Mining

**Required Text:** **Longwall Mining.** 2006.

**Course Objectives:**

This course seeks to introduce the mining engineer to the basic operation and design of the major subsystems that comprise an operating longwall section. The emphasis of the course is on practical design of modern longwall systems with a basic understanding of the fundamental design parameters and interrelation of the various components. Initially, the history and operational trends of longwall mining in the U.S are discussed. Then, the pillar design and ground control aspects of longwall mining are covered. Next, the designs of the various mechanical subsystems of a longwall (shields, shearer and AFC) are presented. Finally, the application and design of secondary and auxiliary aspect of longwall mining, such as dust, methane and subsidence control, secondary support, and face moves are describe. Throughout the descriptions of sub-system design, many examples from active longwall mines are given. Along with more traditional design theories and methods, this course also introduces the Analysis of Longwall Pillar Stability (ALPS) program and the Support Technology Optimization Program (STOP), two programs essential to a practicing mining engineer's tool kit. Ultimately, the student is asked to agglomerate all of the various design subsystems in a final project covering the comprehensive design of an entire longwall system.

**Topics Covered:**

1. Overview of Longwall Mining in West Virginia and the US.
2. Longwall Mining Trends.
3. Longwall Pillar Design and the ALPS program
4. Longwall Strata Mechanics
5. Horizontal Stress
6. Shield Design
7. Secondary Support Design and the STOP program
8. Shearer Design
9. Armored Face Conveyor Design
10. Longwall Ventilation – Dust and Methane Control
11. Subsidence

12. Face Moves
13. Final Comprehensive Design Project

**Lecture Hours:** MW 9.30-10.45 AM

**Grading:** Homework and Quizzes 50%  
 Final Exam 15%  
 Final Project 35%

**Grade Assignment:**

100-97	96-93	92-90	89-87	86-83	82-80	79-77	76-73	72-70	69-67	66-63	62-60	59-0
A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

**Grading Policy:**

Late assignments are docked 10% per day or part thereof. Grading appeals must be submitted in writing on the day the homework 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 and quizzes will be worth 50% of the class grade.

**Quizzes:**

Short quizzes to judge student preparedness and understanding may be given at several times throughout the class. The sum of the homework assignments and quizzes will be worth 50% of the class grade.

**Final Project:**

A final design project will be given to each individual student at the beginning of the term. The project will essentially consist of a practical Longwall design. The final project will be due the week before dead week, and will be worth 35% of the final grade.

**Attendance Policy: -**

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations 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.

**Social Justice Statement:**

“West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious

consideration. 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 arrangement with Disability Services (293-6700).”

Jan. 12 <sup>th</sup>	Orientation, Overview - U.S. Longwall Mining (Longwall census- Coal Age; Read Peng -> p. 1-10, 10-14.)
Jan. 14 <sup>th</sup>	Overview - U.S. Longwall Trends, Overview - Longwall Design (Tsang's paper)
Jan. 14 <sup>th</sup>	Overview - U.S. Longwall Trends, Overview - Longwall Design (Tsang's paper)
Jan. 19 <sup>th</sup>	Holiday
Jan 21 <sup>st</sup>	Basic Design
Jan 26 <sup>th</sup>	Basic Design and Analysis of Longwall Pillar Stability (ALPS) - Theory, Application (2 ALPS paper, Read Peng->91-102)
Jan 28 <sup>th</sup>	Analysis of Longwall Pillar Stability (ALPS) - Theory, Application (2 ALPS paper, Read Peng->91-102)
Feb 2 <sup>nd</sup>	Longwall Strata Mechanics, Horizontal Stress (Read Peng -> p. 46-85; Read 2 horiz. stress papers)
Feb 4 <sup>th</sup>	Longwall Strata Mechanics, Horizontal Stress (Read Peng -> p. 46-85; Read 2 horiz. stress papers)
Feb 9 <sup>th</sup>	Shields - Operation, Design (Read Peng -> p. 129-198)
Feb 11 <sup>th</sup>	Shield - Design, - Design (Read Peng -> p.210-214; figures on 276, 304, 310, 311)
Feb 16 <sup>th</sup>	SME No class
Feb 18 <sup>th</sup>	SME No class
Feb 23 <sup>rd</sup>	Review Final Project
Feb 25 <sup>th</sup>	Secondary Support Design and the STOP program
Mar 2 <sup>nd</sup>	Secondary Support Design and the STOP program
Mar 4 <sup>th</sup>	Shearer - Operation, Design (Read Niederriter, Paschedag, and Peng papers; Read -> 251-323)
Mar 9 <sup>th</sup>	Shearer - Operation, Design (Read Niederriter, Paschedag, and Peng papers; Read -> 251-323)
Mar 11	Shearer - Operation, Design (Read Niederriter, Paschedag, and Peng papers; Read -> 251-323)
Mar 16 <sup>th</sup>	Face Conveyor - Operation, Design, Auxiliary Equipment (Read Peng-> 373-415)
Mar 18 <sup>th</sup>	Face Conveyor - Operation, Design, Auxiliary Equipment (Read Peng-> 373-415)
Mar 23 <sup>rd</sup>	Spring Break
Mar 25 <sup>th</sup>	Spring Break
Mar 30 <sup>th</sup>	Methane Control; (Read Jankowski paper, Read Peng-> 465-511)
Apr 1 <sup>st</sup>	Methane Control; (Read Jankowski paper, Read Peng-> 465-511)
Apr 6 <sup>th</sup>	Dust Control
Apr 8 <sup>th</sup>	Dust Control
Apr 13 <sup>th</sup>	Subsidence
Apr 15 <sup>th</sup>	Subsidence
Apr 20 <sup>th</sup>	Plow
Apr 22 <sup>nd</sup>	Plow
Apr 27 <sup>th</sup>	Design Project Presentation
Apr 29 <sup>th</sup>	SEI and Final Test Review
May 5 <sup>th</sup>	Final Exam (3PM to 5 PM)