

# Explosives Engineering II – MNGN 444

## Course Syllabus

### Spring 2016

**Times and Location:**

Tuesday 11:00 – 12:15 PM BB 206

Thursday 11:00-12:15 PM BB 206, 1:30 – 4:00 (only on lab days) PM BB 125

**Instructor:**

Dr. Vilem Petr: BB 213, (303) 273-3222, vpetr@mines.edu

Office hours: Tuesday 9 – 10 or by appointment ONLY

**Teaching Assistant:**

Eduardo Lozano Sanchez

BB 129, (303) 384-2070, jlozanos@mymail.mines.edu

Office hours: TBA

**Course Website:**

<http://axpro.mines.edu/education.html>

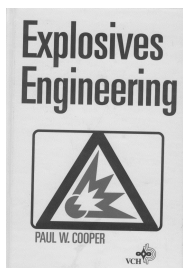
**Course Objectives**

This course gives students in engineering and applied sciences the opportunity to review the fundamental concepts of explosives engineering and science applications as they apply to industry and real life examples. Students will expand upon their MNGN 333 knowledge and develop a more advanced knowledge base including an understanding of the subject as it applies to their specific project interests. Assignments, quizzes, concept modeling and their project development and presentation will demonstrate student learning. Due to its multidisciplinary nature and presentation component, this course may substitute for EPICS-II.

**Course Text**

Primary Text:

Explosives Engineering, Paul W. Cooper



## **Grading**

Grades will be broken down based on the following table.

Midterm	30%
Homework	15%
Quizzes	15%
Final Project Presentation	40%

## **Homework and Quizzes**

There will be weekly homework assignments and quizzes throughout the semester. Homework will usually be due one week from the date assigned.

Quizzes will be given on Thursday during the first ten minutes of class. Quizzes will cover the contents of the prior Tuesday's class. Keys will be posted on Blackboard on Thursday afternoons.

The following rules will be observed during homework:

- 1) Students may work together, but may not copy someone else's work. If caught copying, the student will receive a zero for the assignment. If caught again, the student will fail the course.
- 2) All homework should be done on E2 paper
- 3) Ten percent (10%) will be deducted from the assignment grade for every day the assignment is late.
- 4) Solutions should be boxed or clearly indicated.

## **Safety Lab**

This course has a mandatory lab session at the Explosives Research Laboratory in Idaho Springs. **You must attend ERL Safety Training; there is no opportunity for make-up!** Laboratory sessions for individual projects will be held throughout late March and April.

## **Midterm Exam (TBA)**

The midterm will be a one hour-long exam that will cover all lecture topics to that point and will be structured like the homework assignments and quizzes. The exam will be closed notes and textbook.

## **Projects**

Student projects make up a significant portion of this course, thus a significant amount of your grade will depend upon your efforts and knowledge about your research. At the beginning of the semester students will select one of six projects (further information will be given in class) based upon their individual interests (there is a minimum of three

students per group). The first eight weeks of this course will provide a basic understanding of explosives engineering, and a general overview of each project topic; including offering various methods for data collection and analysis. Students should work diligently work on their respective projects throughout the semester; failure to have a cohesive experimental plan by March 10 will result in a “laboratory session failure.” That is, your group will not be allowed to conduct a project experiment, but will rather present a paper report and presentation with theoretical data and research.

### **Guest Speakers**

There will be several guest speakers over the course of the semester. Important information concerning each project will be given during these sessions. Speakers are industry-partners and will conduct experimentation with respective groups. Thus, attendance at these talks is required. Speakers and dates are listed in the attached calendar and will be announced in class.

### **Attendance**

Regular class attendance and timely completion of assignments is required. 1 class may be missed with no penalty. After that, each unexcused absence will result in a 10% decrease in your final grade. Reading assignments should be completed before each class.

### **EPICS -251 Credit**

Successful completion of MNGN-444 can be used to satisfy the EPICS II credit requirement at CSM.

### **ERL Dress Code**

The following dress code is MANDATORY when working in the Explosives Research Laboratory in Idaho Springs. Violators of any ERL rule will be immediately expelled and not allowed to re-enter this semester.

- Jeans with no holes, tears, etc.
- Steel-toed shoes
- Shirt long enough to cover your back when you kneel down
- Appropriate additional clothing at the site due to weather conditions

We will provide all other required safety equipment.

Dr. Petr must approve pictures or movies taken from any activities at the test site.

If you have any relevant medical conditions, please let Dr. Petr know.

## ***Semester Calendar***

<b>Date</b>	<b>Topic</b>
January 14	Introduction and Explosives Safety
January 19	Introduction in Explosives Engineering
January 21	Basic Definitions and Calculations
January 26	Explosive Property Calculations and Estimation Parameters
January 28	LAB: ERL Safety Training (MUST ATTEND – OFFERED ONCE)
February 2	Guest Lecture on Explosive Welding and Forming
February 4	Explosive Welding: Experimental Methods and Calculations
February 9	Guest Lecture on Oil and Gas Initiation Systems
February 11	Oil and Gas Initiation Systems: Experimental Methods and Calculations
February 16	Guest Lecture on Low Explosives: Propellants and Projectiles
February 18	Propellants and Projectiles: Experimental Methods and Calculations
February 25	Guest Lecture: Case Charge Blasting
March 1	Case Charge Blasting: Experimental Methods and Calculations
March 3	Guest Lecture: Post Blast Fume Studies
March 8	Post Blast Fume Studies: Experimental Methods and Calculations
March 10	Midterm Exam
March 15 and 17	NO CLASS: Spring Break
March 22	Project Workshop
March 24	Presentations of Project Progress
March 28	Project Progress Review
March 31	NO CLASS: E-days
April 5	Project Progress Review
April 7	Project Lab Session: Groups 1 and 2 (4 hours per group)
April 12	Project Progress Review
April 14	Project Lab Session: Groups 3 and 4 (4 hours per group)
April 19	Project Progress Review
April 21	Project Lab Session: Groups 5 and 6 (4 hours per group)
April 26 and 28	Project Progress Review – Report First Drafts
May 3 and 5	Project Progress Review – Report Second Drafts
May 9	Final Reports and Presentations
May 12	Final Reports and Presentations