

**Experimental Methods and Instrumentation for Explosives Engineering
– MNGN 598B
Course Syllabus
Spring 2016**

Times and Location:

Monday 11:00 – 11:50 BB 206

Wednesday 11:00 – 11:50 PM BB 206, 1:00 – 3:50 (only on lab days) PM BB 129

Instructor:

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

Office hours: Tuesday 9 – 10 or by appointment ONLY

Teaching Assistant:

TBD

Office hours: TBD

Course Website:

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

<http://blackboard.mines.edu>

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 Texts:

Phantom Operator Level 1: Certification Student Manual

Phantom operator Level 2: Certification Student Manual

Grading

Grades will be broken down based on the following table:

Homework	15%
Final Presentation and Report	60%
Quizzes	15%
Attendance	10%

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 Monday during the first ten minutes of class. Quizzes will cover the contents of the prior Monday's class. Keys will be posted on Blackboard on Wednesday 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.

Projects

This will be a lab intensive class. Students will select from the following labs for a final project: 2D Images and Camera Synchronization, Schelerian Technique, and Shadowgraph Technique. Lab dates are shown in the attached calendar. The class will be split into groups for the projects. Each group will be presenting in detail their project, and produce a written report. All labs will be held at the Small Scale Laboratory (SSL) on campus.

Guest Speakers

There will be several guest speakers over the course of the semester. 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.

SSL 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

Lecture on Wednesday will meet for the first 6 weeks only.

<u>Date</u>	<u>Topic</u>
January 13	NO CLASS
January 18	Introduction and Syllabus
January 20	Explosives Safety for Blast Chamber
January 25	Introduction into High Speed Imaging
January 27	Lighting Systems and Error Analysis
February 1	Instrumentation
February 3	Guest Lecture
February 8	Guest Lecture
February 10	Software Packages (Phantom Camera, Image J, etc.)
February 15	Introduction into Fluid Mechanics (Mach Number Theory)
February 17	Experimental Set-Ups and Design
February 24	LAB: Schelerian Technique
February 29	Introduction into the Shadowgraph Technique
March 2	LAB: Shadowgraph Technique
March 7	2D Imaging
March 9	LAB: Post-Blast Analysis of Detonators
March 21	Post-Blast Analysis of Detonators
March 23	LAB: Sand Test
March 28	NO CLASS (work on project)
March 30	Project Progress Review

April 4	NO CLASS (work on project)
April 6	Project Progress Review
April 11	NO CLASS (work on project)
April 13	Project Progress Review
April 18	NO CLASS (work on project)
April 20	Project Progress Review
April 25	NO CLASS (work on project)
April 27	First Draft of Project Report Due
May 2	NO CLASS (work on project)
May 4	Second Draft of Project Due
May 9	NO CLASS (work on project)
May 11	Final Report and Presentations Due