

## APPLICATION FOR NEW COURSE

1. Submitted by the College of Engineering Date: 10/31/08

Department/Division proposing course: Mining Engineering

2. Proposed designation and Bulletin description of this course:

a. Prefix and Number MNG 621

b. Title\* Instrumentation for Blasting and Blast Mitigation

\*If title is longer than 24 characters, offer a sensible title of 24 characters or less: Blast Instrumentation

c. Courses must be described by at least one of the categories below. Include number of actual contact hours per week.

() CLINICAL    () COLLOQUIUM    () DISCUSSION    () LABORATORY    () LECTURE  
() INDEPEND. STUDY    () PRACTICUM    () RECITATION    () RESEARCH    () RESIDENCY  
() SEMINAR    () STUDIO    () OTHER – Please explain: \_\_\_\_\_

d. Please choose a grading system:  Letter (A, B, C, etc.)     Pass/Fail

e. Number of credit hours: 3

f. Is this course repeatable?    YES     NO     If YES, maximum number of credit hours: \_\_\_\_\_

g. Course description:

In depth coverage of instrumentation utilized for commercial/mine blast analysis as well as instrumentation used in blast mitigation testing. The course includes hands on operation of advanced instrumentation systems in a laboratory setting.

h. Prerequisite(s), if any:

MNG 331 or MNG 531

i. Will this course also be offered through Distance Learning?    YES     NO

If YES, please check one of the methods below that reflects how the majority of the course content will be delivered:

Internet/Web-based     Interactive video     Extended campus

3. Supplementary teaching component:  N/A     Community-Based Experience     Service Learning     Both

4. To be cross-listed as: \_\_\_\_\_ MORTORIUM ON APPROVAL OI /  
Prefix and Number    department name    Cross-listing Department Chair    chair name

5. Requested effective date (term/year): Spring / 2011

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6. Course to be offered (please check all that apply):  Fall  Spring  Summer
7. Will the course be offered every year?  YES  NO  
If NO, please explain: Will be offered every other year opposite 531 course.
8. Why is this course needed?  
The department needs more graduate offerings and technical electives.
9. a. By whom will the course be taught? Dr. Lusk
- b. Are facilities for teaching the course now available?  YES  NO  
If NO, what plans have been made for providing them?  
\_\_\_\_\_
10. What yearly enrollment may be reasonably anticipated?  
10-15 Every other year
11. a. Will this course serve students primarily within the department?  Yes  No
- b. Will it be of interest to a significant number of students outside the department?  YES  NO  
If YES, please explain.  
It could be of interest to civil engineering graduate students interested in the effects of explosives in a commercial or blast resistant setting.
12. Will the course serve as a University Studies Program course<sup>†</sup>?  YES  NO  
If YES, under what Area? \_\_\_\_\_  
<sup>†</sup>AS OF SPRING 2007, THERE IS A MORTORIUM ON APPROVAL OF NEW COURSES FOR USP.
13. Check the category most applicable to this course:
- traditional – offered in corresponding departments at universities elsewhere
  - relatively new – now being widely established
  - not yet to be found in many (or any) other universities
14. Is this course applicable to the requirements for at least one degree or certificate at UK?  Yes  No
15. Is this course part of a proposed new program?  YES  NO  
If YES, please name: \_\_\_\_\_
16. Will adding this course change the degree requirements for ANY program on campus?  YES  NO  
If YES<sup>‡</sup>, list below the programs that will require this course:

<sup>‡</sup>In order to change the program(s), a program change form(s) must also be submitted.



## Syllabus Mining 621 – Instrumentation for Blasting and Blast Mitigation

Spring Semester 2010

Dr. Braden Lusk - [lusk@engr.uky.edu](mailto:lusk@engr.uky.edu)

Office: 234D MMRB Phone:257-1105

### Course Description:

In depth coverage of instrumentation utilized for commercial/mine blast analysis as well as instrumentation used in blast mitigation testing. The course includes hands on operation of advanced instrumentation systems in a laboratory setting.

### Class Goal:

Obtain a general understanding of instrumentation involved with blasting and blast mitigation testing.

### Outcomes tied to ABET a-k:

1. Students will have the ability to design analysis systems for commercial/mine blasts.
  - (c) An ability to design a system, component, or process to meet desired needs
  - (e) An ability to identify, formulate, and solve engineering problems
2. Students will be equipped with the tools necessary to continue studying blast instrumentation and obtain useful data in situations where explosives are applied.
  - (i) A recognition of the need for, and an ability to engage in lifelong learning
3. Students will understand when instrumentation is needed, and how it should be applied.
  - (a) An ability to apply knowledge of mathematics, science, and engineering
4. Students will be able to communicate technical blast instrumentation data in a useful format.
  - (g) An ability to communicate effectively
  - (b) An ability to design and conduct experiments, as well as to analyze and interpret data

### Grading/Points:

	<i>Weight:</i>
Homework, project assignments:	30%
Lab write ups:	20%
Major Paper Assignment:	20%
Final Exam:	20%
Class Participation:	10%

It is anticipated that the final grades will be based on a straight scale as follows:

- A: 90% - 100%
- B: 80% - 89%
- C: 60% - 79%
- E: < 60%

### Homework:

There will be homework assignments and design problems throughout the semester; some of these will be technical writing oriented assignments. The assignments will enhance the students' ability to communicate technical information. It is expected that 4 topic related assignments will be given. Due dates will be assigned.

### Lab Write Ups:

A certain number of class lecture times will be scheduled as laboratory experiments. The labs will be performed under the supervision of Dr. Lusk; however, students will be required to submit group reports on the labs performed. Due to the nature of the labs and software required, data will need to be prepared

for the students following the experiments. It is expected that 4 topic related laboratory experiments will be scheduled.

**Major Paper Assignment:**

Each Student in the course will be required to submit a research paper covering an approved topic. The topics will need to be approved by February 15<sup>th</sup>. Topics can include any of the covered topics in the course or any blast instrumentation related topic selected by the student. Each paper will require a 4-5 page document and include a PowerPoint presentation of the information.

**Final Exam:**

The Final Exam will consist of several topic related questions. The test format will be short answer and limited calculations.

**Field Data Collection Assignment:**

Students will be required to collect field data in a group format. The field data will be selected and approved by Dr. Lusk. This additional assignment will include a report of the data collected, and a presentation of the results at the end of the course.

**Class participation:**

Questions are encouraged. Participation in hands on portions is required and graded accordingly. Class attendance is required. A student must arrive within 5 minutes of the scheduled start of class and must stay for the remainder of the period to be credited for attendance. Your grade will be reduced by 5% for each week-equivalent of class missed beyond one week. For example, since Mining 621 meets 2 times per week, the following grade reductions would be incurred:

Number of Unexcused Absences	Grade Reduction
1-2	0%
3-4	5%
5-6	10%

Excused absences, as defined in the University Bulletin, are not counted in this total. Repeated absences will result in grade deductions.

**Textbook:**

Course Notes (provided)

**Recommended Additional Books:**

*Blast Vibration Monitoring and Control* by Dowding; *ISEE Blasters Handbook*

**Course Content:**

The course outline for Mining 621 has been separated into several sections. An outline for the lecture series is shown below to act as a guide to lectures given as part of this course. You will be notified of what lectures will be given each week in class. Supplemental material for various topics will be produced whenever necessary.

1. Safety for Instrumentation (1 Lecture)
2. Explosive and Explosion Properties (1 Lecture)
3. Cabling for Instrumentation (1 Lecture)
4. Pressure Measurement (1 Lecture)
5. Data Acquisition (1 Lecture + 1 Lab)
6. Pressure Data Manipulation (1 Lecture)
7. Seismographs (Near field) Seismic & Acoustic (1 Lecture + 1 Lab)
8. Seismograph Data Analysis and Manipulation (1 Lecture)

9. Cap scatter - Accuracy Testing (1 Lecture)
10. Photographic Recording of Blasting Events (General) (1 Lecture)
11. Advances in Photography (Digital) (1 Lecture)
12. High Speed Photography and Video (1 Lecture + 1 Lab)
13. Velocity of Detonation (1 Lecture)
14. Laser Profiling/ Fragmentation Analysis Through Photography (1 Lecture)
15. Electronic Detonators (1 Lecture + 1 Lab)
16. Firing Systems (1 Lecture)
17. Assorted Small Topics (Remainder)