

## APPLICATION FOR NEW COURSE

1. Submitted by the College of Engineering Date: Feb 18, 2009

Department/Division proposing course: Mining Engineering

2. Proposed designation and Bulletin description of this course:

a. Prefix and Number MNG 531

b. Title Advanced Blast Design and Technology

\*If title is longer than 24 characters, offer a sensible title of 24 characters or less: Adv Blast Des and Tech

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:

Advanced theory and application of explosives in excavation; detailed underground blast design; specialized blasting including blast casting, construction and pre-splitting. Bulk systems for blasting, electronic detonators, and introduction to demolition blasting. Introduction to blasting research. Examination of field applications.

h. Prerequisite(s), if any:

MNG 331

Engineering Standing

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: \_\_\_\_\_ / \_\_\_\_\_  
Prefix and Number    Cross-listing Department Chair

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: Every two years is adequate for anticipated enrollment

8. Why is this course needed?

Graduate students or undergraduate students with an interest in blasting will benefit from the information presented in this course.

This course will fulfill the requirements for technical elective in mining engineering.

9. a. By whom will the course be taught? Dr. Braden 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?

15

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.

12. Will the course serve as a University Studies Program course<sup>1</sup>?  YES  NO

If YES, under what Area?

<sup>1</sup>AS OF SPRING 2007, THERE IS A MORATORIUM 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>2</sup>, list below the programs that will require this course:

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<sup>2</sup>In order to change the program(s), a program change form(s) must also be submitted.

17.  The major teaching objectives of the proposed course, syllabus and/or reference list to be used are attached.
18.  Check box if course is 400G- or 500-level. If the course is 400G- or 500-level, you must include a syllabus showing differentiation for undergraduate and graduate students by (i) requiring additional assignments by the graduate students; and/or (ii) the establishment of different grading criteria in the course for graduate students. (See SR 3.1.4)
19. Within the department, who should be contacted for further information about the proposed new course?

Name: Dr. Braden Lusk Phone: 257-1105 Email: lusk@enr.uky.edu

20. Signatures to report approvals:

11-11-08  
DATE of Approval by Department Faculty

Rick Honaker / Rick Honaker  
Reported by Department Chair

11-20-09  
DATE of Approval by College Faculty

RICHARD J. SWEIHAARD / Richard Sweighard  
Reported by College Dean

1-19-2010  
\* DATE of Approval by Undergraduate Council

S Gill / Haron Dier  
Reported by Undergraduate Council Chair

\* DATE of Approval by Graduate Council

Reported by Graduate Council Chair

\* DATE of Approval by Health Care Colleges Council (HCCC)

Reported by Health Care Colleges Council Chair

\* DATE of Approval by Senate Council

Reported by Office of the Senate Council

\* DATE of Approval by University Senate

Reported by Office of the Senate Council

\*If applicable, as provided by the *University Senate Rules*. (<http://www.uky.edu/USC/New/RulesandRegulationsMain.htm>)

## Syllabus Mining 531 – Advanced Blast Design and Technology – Spring Semester 2011

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

Office: 234D MMRB Phone: 257-1105

### Course Description:

Advanced theory and application of explosives in excavation; detailed underground blast design; specialized blasting including blast casting, construction and pre-splitting. Bulk systems for blasting, electronic detonators, and introduction to demolition blasting. Introduction to blasting research. Examination of field applications. Prerequisite: MNG 331, Engineering Standing

### Class Goal:

Move from basic understanding of explosives and explosive products to more advanced ability to design specialized blasts.

### Outcomes:

1. Students will have the ability to design blasts beyond basic bench blasting.
  - (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 blasting and handle even more complex blasting situations.
  - (i) A recognition of the need for, and an ability to engage in lifelong learning
3. Students will have a firm grasp on the requirements and responsibilities both legal and ethical associated with the use of explosives.
  - (f) An understanding of professional and ethical responsibility
4. Students will be able to communicate technical blasting information effectively.
  - (g) An ability to communicate effectively
5. (Graduate Students) will be able to communicate advanced technical information effectively (Graduate students will be required to write an additional technical paper on an advanced topic of their choice (as it relates to this course). (The grade received on this paper will be averaged with the exam score with equal weight.)

### Grading/Points:

	Weight	
	Undergrads	Grads
Homework, project assignments	50%	50%
Exam 1	20%	10%
Advanced topic paper	NA	10%
Final design problems	20%	20%
Class participation	10%	10%

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

	Undergrads	Grads
90% - 100%	A	A
80% - 89.9%	B	B
70% - 79.9%	C	C
60% - 69.9%	D	E
< 60%	E	E

**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. Due dates will be assigned.

**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 599 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:**

*Rock Blasting and Explosives Engineering* by Persson, Holmberg, and Lee; *Applied Explosives Technology* by Olofsson; *ISEE Blasters Handbook*

**Course Content:**

The course outline for Mining 531 has been separated into 10 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 Introduction**

1.1 Introduction

**2 Trends**

2.1 Explosives

2.2 Initiation

2.3 Drilling

2.4 Loading

**3 Underground Heading Design**

3.1 Heading Design Introduction

3.2 Burn Cuts

3.3 V Cuts & Fan Cuts

3.4 Main Round Design

3.5 Example Problem

**4 Underground Specialist Blasting**

4.1 Vertical Crater Retreat

4.2 Blind Raise Drilling

4.3 Mass Blasting

**5 Environmental Factors**

5.1 Blasting Vibration & Fumes

5.2 Effect of Geology

5.3 Perimeter Control

5.4 Environmental Control

**6 Fragmentation and Oversize Control**

6.1 Fragmentation

6.2 Oversize Control

**7 Surface Blasting**

7.1 Advanced Blast Design

7.2 Powder Factor

7.3 Optimizing Shots

7.4 Sinking Cuts

7.5 Blast Casting

7.6 Angle Drilling

7.7 Construction

7.8 Close in Construction Blasting

## **8 Performance Monitoring and**

### **Troubleshooting**

**8.1 Blast Monitoring Technology**

**8.2 Troubleshooting**

**8.3 Decking**

## **9 Bulk Systems**

**9.1 The Evolution in Bulk Delivery Systems**

**9.2 Capacity and loading**

**9.3 Bulk truck selection**

**\*Demolition will be covered if time allows**