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 ( ) COLOQUIUM ( ) 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:

   Prefix and Number MORTORIUM ON APPROVAL OF

   Cross-Listing Department Chair

5. Requested effective date (term/year): Spring / 2011
APPLICATION FOR NEW COURSE

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? □ YES □ NO
    If YES, under what Area?
    *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?
    If YES, please name:
    □ YES □ NO

16. Will adding this course change the degree requirements for ANY program on campus? □ YES □ NO
    If YES*, list below the programs that will require this course:

*In order to change the program(s), a program change form(s) must also be submitted.
The major teaching objectives of the proposed course, syllabus and/or reference list to be used are attached.

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)

Within the department, who should be contacted for further information about the proposed new course?

Name: Braden Lusk
Phone: 7-1105
Email: lusk@engr.uky.edu

Signatures to report approvals:

November 11, 2008
DATE of Approval by Department Faculty

03/26/10
DATE of Approval by College Faculty

Rick Hanaker, Rick Hanaker
Reported by Department Chair

Jannette Blackwell
Reported by Undergraduate Council Chair

09:53:55 - 04'00'

* DATE of Approval by Undergraduate Council

* DATE of Approval by Graduate Council

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

* DATE of Approval by Senate Council

* DATE of Approval by University Senate

* If applicable, as provided by the University Senate Rules.
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:

| Weight | 
|---|---|
| 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 15th. 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:

<table>
<thead>
<tr>
<th>Number of Unexcused Absences</th>
<th>Grade Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>0%</td>
</tr>
<tr>
<td>3-4</td>
<td>5%</td>
</tr>
<tr>
<td>5-6</td>
<td>10%</td>
</tr>
</tbody>
</table>

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)