Proposal for

a

Master of Science in Explosives Engineering

in

2009
Why?

- Long tradition of explosives teaching and research
  - going back to start of MSM
- Increase in activity in recent years
  - Explosives emphasis 97
  - Explosives certificate 2005
  - Explosives Minor 2005
- Explosives Camp (recruiting)
- Request by students for a degree
- Good tool for interesting students to stay on for graduate school
- Interest from Industry & military esp. FTLW
S&T Strategic plan 2008-2012
Objective 2

• Manage the Academic Portfolio and Increase Enrollment
  – Missouri S&T will increase its enrollment while maintaining the quality of its student body by improving access and affordability, expanding diversity, increasing retention, and expanding extended learning activities........
Mining Engineering Program
Strategic Plan 2006-2010

• Strategic Initiative 1: maintaining S&T at the frontiers of mining Engineering Education and Research

• Objective 1.3
  – Introduce the M.S. in Explosives Engineering by FS07
  – Action 1.3a: Add additional faculty to the explosives Engineering Program (Jan 08)
  – Action 1.3b: Add one GTA to assist the teaching requirements of the Explosives Engineering courses.

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY
Campus Administrative Support

- Chancellor requested growth in this area
- Supported by approval of additional faculty position in 07-08
- Requested increase in explosives camps
- Recognize the uniqueness and potential growth of the area.

Missouri University of Science and Technology
Statistics on program

• Currently enrolled
• Minor:
  – 30 undergrads
• Certificate
  – 4 grad
  – 1 undergrad
• Many do not enroll until just before graduation
Degrees Awarded With

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Projected Student Demand

- Projected Enrollment Potential Yrs 1-5

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Target projection as of 9/08 (in proposal)
Actual Student Demand

- S&T Students requested to date Yrs 1-3

<table>
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<tr>
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<tr>
<td>Total</td>
<td>9</td>
<td>6</td>
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- Students polled 20 January ’09
- We will be ahead of original projections by 50%
Some of the 17 students

- Photographs of the students.
Program Structure

- Total credits required for graduation: 30 hrs
- Residency requirements: research on campus
  - With industry exceptions (mainly ME, government)
- Course requirements:
  - Elective credits 12 hrs
- Thesis based on research hours.
  - ExpE 490 (research) 6 hrs
- Internship recommended but not required.
Core Classes

- ExpE 307 Principles of Explosives Engineering
- ExpE 350 Blasting Design and Technology
- MiEng 383 Tunneling & Underground Construction Techniques
- ExpE 351 Demolition of Buildings & Structures
- ExpE 402 Environmental Controls for Blasting
- ExpE 406 Scientific Instrumentation for Explosives Testing and Blasting
Elective Explosives Classes

• ExpE 309 Commercial Pyrotechnics Operation
• ExpE 310 Stage Pyrotechnics & Special Effects
• ExpE 305 Explosives Handling & Safety
• ExpE 491 Internship
• ExpE 401 Blast Mitigation
• ExpE 407 Theory of High Explosives
Rock Blasting Electives

- Geo 220  Structural Geology
- Geo 301  Advanced Structural Geology
- GeEng 371  Rock Engineering
Demolition Electives

- CvEng 217  Structural Analysis I
- CvEng 320  Structural Analysis II
- Cv Eng 223  Reinforced Concrete Design
Weapons System Design Electives

- McEng 336  Fracture Mechanics
- AeEng 251  Aerospace Structures I
- McEng 321  Advanced Mechanics of Materials
Thesis Requirements

• All candidates will write and defend a thesis based on their research hours at the conclusion of their course work.
Practical Experience

• Explosives engineering is a practical as well as theoretical subject
• An internship is recommended (not required).
• An internship will be strongly encouraged for those without explosives-related industry work experience.
Staffing

• 2 explosives personnel mining
  – Hope to add an extra person as numbers grow
• Other on campus personnel
• Other System personnel
• Outside personnel
• Hope to gain 1 FTE GTA
Current offering of courses

- We now have enough courses in place
- 8 explosives related classes were given in 2008
- Some 400 level classes will be given once every 2 years
- 4 classes are offered as distance
  - It is hoped to add at least 2 other classes in the next 18 Months
Financial

• We have a budget
  – But understand we are going to go through some lean times
  – Willing to forgo financial support until budget situation improves

• Will not be able to grow class offerings as fast as would like and will have to change tactics
  – Will concentrate growth on the distance portion
  – Will look more to adjunct teaching staff for new courses

• We can support what we propose at this time

Missouri University of Science and Technology
Questions?
Poor timing

• Original submission planned early spring 2008
  – House hit by tornado on Jan 7 08
  – 3 sessions of explosives camp
• Proposal draft completed 9/08
  – Slowed down by ABET in fall of 08
  – Final submission late November 08