

**Explosive Engineering 5721**  
Specialty Uses of Energetic Materials  
Spring Semester - 2018  
3 Credit Hour  
Instructors: Dr. Paul Worsey (pworsey@mst.edu)  
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**Experimental Mine Phone: 573-341-6406**

**Course Description**

Specialty Uses of Energetic Materials was co-operatively developed by Paul and Tony specifically for the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) to give students the familiarization of explosives and energetic materials. This course should familiarize and train inspectors in a wide range of energetic materials so that they may apply this knowledge to the prosecution of their work.

**Course Objectives**

This course is designed to give inspectors familiarization with explosives and energetic materials in applications that are different than mine blasting. This includes topics from the use of explosives in the aerospace, military, civil, and numerous other sectors. The objective of this course is to give students the ability to apply and use this knowledge to advance and improve their work.

**Textbook (on web)**

No Textbook is required for this course. All course material will be presented on canvas, primarily utilizing PowerPoints with audio recordings

**Grading**

Quizzes	40%
Project Papers (3)	60%

**Quizzes**

Quizzes will be given after each major section of the course (ex. Section 3 Aerospace). These quizzes will be 10-20 questions long and will need to be completed no later than April 30<sup>th</sup> 2018. Any quizzes not completed by this date will receive a zero in the grade book. There will be anywhere from 10 to 12 quizzes.

**Project Papers**

Throughout the semester three (3) project papers will be given with due dates on Canvas. Details on the topics and grading policy will be given on Canvas with each paper being worth 20% of your total grade.

## **Outline of Topics**

- 1 Introduction
  - 1.1 Definition for Energetics and Division
- 2 Description and Categorization of Energetic Materials
  - 2.1 Explosive Sensitivity
  - 2.2 Properties Important for Use
- 3 Energetic Materials in the Aerospace Industry
  - 3.1 Energetic Materials in Aircrafts
  - 3.2 Energetic Materials in Spacecrafts
  - 3.3 Rocket Fuels
- 4 Military Explosives
  - 4.1 Explosive Ordnance
  - 4.2 History of Military Explosives
  - 4.3 Initiation Systems
  - 4.4 Mines
  - 4.5 FAEs
  - 4.6 Demil
  - 4.7 Military Demolition
  - 4.8 Bomb Squad
  - 4.9 Tactical Breaching
- 5 Forestry and Parks
  - 5.1 Danger Trees
  - 5.2 Boulders
  - 5.3 Roads and Access
  - 5.4 Carcass Removal
- 6 Oil and Gas
  - 6.1 Exploration
  - 6.2 Oil Well Stimulation
- 7 Welding
  - 7.1 Pipes
  - 7.2 Plate Materials
  - 7.3 Thermites
- 8 Underwater Blasting
  - 8.1 Regular Shots
  - 8.2 Coral Reefs
  - 8.3 Underwater Demolition
  - 8.4 Effects on Marine Life
- 9 Pyrotechnics
  - 9.1 Theatrics
  - 9.2 Cinematic Special Effects
- 10 Automotive
  - 10.1 Air Bags
- 11 Avalanche Control
- 12 Agricultural Use
- 13 Weird Uses
  - 13.1 Meat Tenderization
  - 13.2 Marrons and Train Warning Charges
  - 13.3 Sinking Ships for Artificial Reefs
  - 13.4 Metal Forming
  - 13.5 Pulsed Powder Generation

\*Subject to change during development of the course

## **Academic Dishonesty**

Plagiarism, cheating, misrepresentation, sabotage and all forms of academic dishonesty are prohibited. Refer to <http://campus.mst.edu/registrar/academicregs/> page 30 of the S&T Student Academic Regulations Handbook on student conduct relative to the System's Collected Rules and Regulations, section 200.010 for additional information. If an incident occurs we will try to resolve it with the class staff members, if at that point it cannot be resolved or reoccurs the incident will be turned over to Dr. Braden Lusk, Mining Department Chairman. Any and All academic Dishonesty will be taken very seriously including: receiving no points on assignment/quiz, losing attendance points for day of class, and possibly removal from class if continued academic dishonesty is continued.

## **Academic Alert System**

[www.campus.mst.edu/acalert/](http://www.campus.mst.edu/acalert/):

## **Disability Support Services**

<http://counsel.mst.edu>. If you have a documented disability, which requires accommodations in this course, you are strongly encouraged to meet with Jim Taylor early in the semester. You must request Disability Services staff to send Jim a letter verifying your disability and specifying the required accommodation before it can be done.