1. ER461 Nuclear Weapons Effects

2. Credit Hours (3)/Contact Hours (3)

3. Course Director – Stephen R. McHale

4. Textbooks
   Required: The Effects of Nuclear Weapons, 3rd ed., S. Glasstone and P.J. Dolan, 1977.
   Supplemental: Swords of Armageddon, Volume I, The Development of U.S. Nuclear Weapons, 2nd ed., C. Hansen, 2007.
   Supplemental: Introduction to the Physics of Nuclear Weapon Effects, C. Bridgman, 2001.
   Supplemental: Handbook of Nuclear Weapon Effects, J. Northrop, 1996.

5. Specific course information
   a. Introduction to nuclear weapons with historical references, yield calculations, physics of assembly, fission, fusion, and disassembly. Prompt and residual effects, modeling, biological effects, and nuclear policy are covered.
   b. Prerequisites: SP212, SM212
   c. Elective course

6. Educational objectives for the course

   a. apply physical concepts and principles to solve relevant problems related to the design, prompt, and residual effects of nuclear weapons
   b. comprehend empirical relationships and engineering tools used by the Department of Defense nuclear weapon effects communities
   c. develop computing tools to make approximate, quantitative estimates of at least one prompt or residual effect of nuclear detonations
   d. communicate effectively, both verbally and in writing, the critical examination and analysis of engineering problems
   e. demonstrate knowledge of contemporary nuclear issues

7. Specific program outcomes addressed by this course

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reinforced		X	X	X	X	X	X
Mastered	X						

8. Brief list of topics to be covered
   a. Energetics and design principles of fission and thermonuclear weapons
   b. Atmospheric (above ground) prompt effects of nuclear weapons
      i. X-ray transport and effects
      ii. Thermal radiation transport and effects
      iii. Air blast propagation and effects
      iv. Electromagnetic pulse propagation and effects
      v. Initial radiation (neutrons and gamma-ray photons) transport and effects

c. Underground and underwater shock propagation and effects
d. Residual effects of nuclear weapons (fallout and biological effects)