Course Information PHY 506 - Fall 2006

Physics 506 (Nuclear and Subatomic Physics) provides an introduction to modern nuclear physics and is intended for advanced undergraduate or graduate students. A brief outline is provided below.

1. **Lecture:** MWF 12:25-1:15, rm204
   Instructor: T. Schaefer, Office BOM-210, Phone 513-7199
   email: Thomas_Schaefer@ncsu.edu
   Office hours: We. 1:30-2:30 and by appointment.

2. **Homework:** Most mondays a set of homework problems will be assigned. (You can also check the website.) The homework is due monday the following week.

3. **Exams:** There will be one midterm exam, but no final. Instead, we will assigns papers/projects and students will make presentations.

4. **Grade:** Your final grade will be determined by weighting the various portions of the course as follows:

Midterm:	20%
Final Project :	50%
Homework:	30%

5. **More Information:** Additional information related to the course is available at `http://wonka.physics.ncsu.edu/~tmschaef/` . The official course syllabus can be found at `http://www.physics.ncsu.edu/courses/tmschaef/Fall2006-506-001.html.` .

6. **Textbook:** (not required, but recommended) Fundamentals in Nuclear Physics: From Nuclear Structure to Cosmology, by Jean-Louis Basdevant, James Rich, Michael Spiro (listed for $68 at amazon.com). Supplemental references

   - K. Krane, Introductory Nuclear Physics
   - S. S. M. Wong, Introductory Nuclear Physics
   - B. Povh et al., Particles and Nuclei

- A. W. Thomas, W. Weise, The Structure of the Nucleon

There are many more advanced text books, for example A. Bohr and B. Mottelson, Nuclear Structure (2 Vols), and H. Feshbach, Theoretical Nuclear Physics (2 Vols). Some supplemental material will be handed out in class or posted on the website.

7. **Rough outline:**

- Nucleons and Nuclear Forces
  Properties of Nucleons and Nuclei
  Nucleon-Nucleon forces and the deuteron
  Conservation laws, isospin.
- Nuclear Models and Nuclear Stability
  The Fermi Gas and Liquid Drop Models
  Radioactivity, Fusion and Fission
  The Shell Model
- Weak Interactions and Neutrinos
  Weak Interactions: β-deacy, e capture, etc
  Quarks and leptons
  Neutrino Physics
- Fission and Fusion, Nuclear Astrophysics
  Fission reactions, nuclear energy
  Fusion recations
  Stellar burning
- The Quark Structure of Matter
  Deep Inelatic Scattering and the Structure of the Nucleon
  Heavy Ion Collisions and the Quark Gluon Plasma