Course Information PHY 506 - Fall 2004

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/Fall2004-506-001.html`. .

6. **Textbook:** (not required, but recommended) K. Krane Introductory Nuclear Physics. Supplemental references

   - 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:**

   - Introduction
     Properties of Nuclei and Nucleons.
   - The Nucleon-Nucleon Interaction and the Deuteron
     Elements of Quantum Mechanics
     The Nucleon-Nucleon Interaction
     Bound States: The Deuteron
     Nucleon-Nucleon Scattering
   - Finite Nuclei: Single Particle and Collective States
     The Fermi Gas and Liquid Drop Models
     Radioactivity, Fusion and Fission
     The Shell Model
     Collective States
   - Nuclear Physics at JLAB: The Quark Structure of the Nucleon
     Deep Inelastic Scattering and the Discovery of Quarks
     Quarks and Gluons
     Properties of the Nucleon, Excited and Exotic states
     The Nucleon-Nucleon Interaction, revisited.
   - Nuclear Physics at RHIC: Nuclear Collisions
     and Nuclear Matter under Extreme Conditions
     Phases of Nuclear Matter
     Quark Gluon Plasma
     Heavy Ion Collisions
   - Nuclear Physics Underground: Neutrinos and the Solar Neutrino Problem
     Energy Production in Stars
     Nucleosynthesis
     Neutrino Physics.