NUCLEAR PHYSICS

V Gibson

Basic Nuclear Properties: Nuclear constituents, binding energy, mass, spin and parity, size, moments, NMR, radioactivity. Cross-sections, units and notation.

The Nucleon Force: General features, the deuteron, nucleon-nucleon scattering. Yukawa potential and meson exchange.

The Nuclear Shell Model: Magic numbers, the Nuclear Shell Model and its predictions, excited states of nuclei (vibrations and rotations).

Nuclear Decay: α decay. β decay, Fermi theory of β decay, parity violation. γ decay, Mössbauer effect.

Nuclear Reactions: Q values, types of reaction, compound nuclei, Breit-Wigner formula. Fission and reactors. Fusion. Nucleosynthesis and the solar γ problem.

BOOKS

A sample of introductory books to Nuclear Physics is given below:
Introductory Nuclear Physics, Krane K S (Wiley 1988). This covers most of the course material. Recommended.
Basic Ideas and Concepts in Nuclear Physics., Heyde K (IoP Publishing 1999)
Nuclear Physics: Principles and Applications, J. Lilley (Wiley 2002). This is very good for applications.

Introductory books to both Nuclear Physics and Particle Physics:
Nuclear and Particle Physics, Bircham WE and Jobes M (Longman Scientific and Technical 1995)
The Physics of Nuclei and Particles, Dunlop PA (Thomson Brooks/Cole 2003).
Introduction to High Energy Physics, Perkins DH (4^{th} edn CUP 2000). A useful introductory Particle Physics book.

Many older texts are very good, but frequently out of print:
Introduction to Nuclear Physics, Enge H A (Addison-Wesley 1966, 69, 72). Out of print
The Atomic Nucleus, Evans R D (McGraw-Hill 1955). Out of print
Nuclei and Particles, Segré E (2nd edn Addison-Wesley 1977). Out of print
Theoretical Nuclear Physics, Blatt J M & Weisskopf V F (Dover 1991)