This course is an introduction to:

* The structure and properties of atoms and nuclei
* Nuclear atom
* Hydrogen atom
* Bohr/deBroglie model
* Electron spin
* Quantum theory
* Lamb shifts
* Fine and hyperfine structure
* External fields.
* Many electron atoms
* Pauli principle
* Multiplets
* Periodic table
* X-ray spectra
* Vector coupling
* Systematics of ground states
* Interaction of atoms with light
* Radioactivity
* Nuclear forces and nuclear models
* Nuclear reactions
* Nuclear Energy, fission and fusion

This course is aimed at upper level undergraduate and early graduate students in physics, materials science, chemistry and engineering who desire or need a good understanding of the properties of atoms and nuclei.

The course assumes a basic understanding of quantum theory, though many aspects of it will be reviewed as required.

Homework will be assigned weekly, will be reviewed, collected and graded.

There will be two class quizzes—in mid-March and mid-April, and a term research paper with an oral presentation in lieu of a final exam. Term paper topics must be chosen by April 1 and approved by the instructor. They should be based on material in the textbook, but go beyond what is covered in class.