PHYS 4352 501 Modern Physics II (3 semester hours)

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office hours: T & R 3;00 - 5:00 pm

Goal of course :

General introduction into Nuclear Physics and
Elementary Particle & High Energy Physics

Course description :

Nuclear Models; Major nuclear properties; Nuclear sizes and densities; Nuclear masses and abundances; The Liquid Drop Model; Magic Numbers; The Fermi Gas Model; The Shell Model; The Collective Model.

Nuclear decay; Alpha Decay; Beta Decay; The weak Interaction; Gamma Decay; The Mossbauer Effect; Nuclear reactions; Excited states of nuclei; Fission and Nuclear Fission Reactors; Safety of Nuclear Reactors; Nuclear Fusion and Fusion Reactors; Fusion and the origin of elements.

Introduction to Elementary Particles; Nucleon Forces; Isospin; Pions; Leptons and Quarks;

Strangeness; Families of Elementary Particles; Conservation laws; The Standard Model; Evidence for Partons; Unitary Symmetry and Quarks; Color and the Color Interaction;

Gauge Theories; Quantum Cromodynamics; Electroweak Theory; Grand Unification and the fundamental interactions; the controversy between Relativity and Quantum Field Theories; The light at the end of the tunnel: String Theories and M-Theory.

Grading :

Grading is based on homeworks (33%), midterm examination { 33% } and term paper {33%).

The subject of term paper must be clarified in advance with the instructor.

Textbook :

Quantum Physics by R. Eisberg and R. Resnick
John Wiley and Sons, Second Edition, 1985.
Chapters 15, 16, 17 and 18.