



# SH2008 Grundläggande modern fysik 6,0 hp

## Introductory Modern Physics

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Kursplan för SH2008 giltig från VT09, utgåva 1.

### Lärandemål

After completing the course, the student should:

- Be able to explain the scientific basis of modern physics as defined by the course content.
- Be able to construct and perform quantum mechanical calculations of simple systems.
- Be able to apply quantum mechanical principles within the natural sciences and technology.
- Have acquired practical experience of experimental methods within modern physics.

### Kursens huvudsakliga innehåll

#### Part I (The experimental background of Modern Physics and Quantum Mechanics) 5 hp

The experimental background of modern Physics. Material waves (“de Broglie waves”). Wave packets and the Heisenberg uncertainty relation. Wave-particle duality. Atomic structure. The Bohr model of the atom. Atomic energy levels. The foundations of quantum mechanics. Applications of the Schrödinger equation to simple potentials. Interpretations of wave functions. Plane wave solutions. The harmonic oscillator. Angular momentum and spin. The hydrogen atom and the periodic table. The Pauli principle. Planck’s radiation law. X-ray emission and spectra. The structure of the nucleus. Radioactive decay. Application of phenomena such as the photoelectric effect. Quantum mechanical phenomena in the natural sciences and technology, such as tunneling, scanning microscope, the Stern-Gerlach experiment, atomic nuclei, simple molecules. Insulators, conductors and semiconductors.

#### Del II (Laboratory exercises), 1 hp:

Two laboratory exercises with written reports.

### Behörighet

Basic integral and differential calculus, basic algebra and basic mechanics.

### Litteratur

Randy Harris, Modern Physics, Second edition, Pearson International Edition

### Examination

- LAB1 - Laboration, 1,0 hp, betygsskala: P, F
- TEN1 - Tentamen, 5,0 hp, betygsskala: A, B, C, D, E, FX, F

TEN Exam 5 hp, scale B, C, D, E, FX, F

LAB1+2 Laboratory work: scale P, F