



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF SCIENCES
PHYSICS PROGRAM

CF541 – QUANTUM MECHANICS II

I. GENERAL INFORMATION

CODE	: CF451 – Quantum Mechanics II
SEMESTER	: 7
CREDITS	: 06
HOURS PER WEEK	: 08 (Theory – Practice)
PREREQUISITES	: CF302 Quantum Mechanics I
CONDITION	: Mandatory

II. COURSE DESCRIPTION

To study the fundamentals of the time-independent and time-dependent perturbations theory and apply them to study and analyze simple quantum systems without an exact solution.

III. LEARNING UNITS

1. Quantization of the Angular Moment

Algebraic quantization of the angular momentum. Quantization of the third component. Dimensioning the eigenvalues of the third component.

2. Sum of Angular Moments

The problem of the sum of the angular moments. The direct sum of two states spaces of non-interacting physical systems and the expansion of angular momentum operators. The addition operator and the states and eigenvalues.

3. Stern-Gerlach Experiment

The Stern-Gerlach experiment and its interpretation: the IAM (intrinsic angular momentum). Similarity to the case of light passing through a prism and the electrons passing through a magnetic field with a gradient. Modified Schrödinger equation.

4. Hydrogen Atom

Total angular momentum for the hydrogen atom. The fine structure. Approximate solutions of the real states: time-dependent perturbations.

5. Problems of Many Bodies

The problem of many bodies and identical particles. Symmetric and antisymmetric states. The Pauli principle.

6. Applications

The helium atom. Ammonia maser. Introduction to the scattering theory. Introduction to the Feynman integral paths.

IV. BIBLIOGRAPHY

- B.H. Bransden & C.J. Joachain. Quantum Mechanics. Benjamin Cummings, 2 edition, 2000.
- W. Greiner, Quantum Mechanics, Springer, 2001.
- David J. Griffiths, Introduction to Quantum Mechanics, Pearson Education, Inc, 2005.
- Cohen-Tannoudji, C., Diu, B. y Laloë, F. Quantum Mechanics, Vols. I y II, John Wiley Inc., N.Y., 1977.
- Davidov, A. S., Quantum Mechanics (2 ed.), Pergamon Press, 1976.
- P. Dirac, Principios de Mecánica Cuántica, Ediciones Ariel, Barcelona, 1967.