



UNIVERSIDADE FEDERAL DO CEARÁ

**FEDERAL UNIVERSITY OF CEARÁ
OFFICE OF THE VICE PROVOST FOR UNDERGRADUATION (PROGRAD)
COORDINATION FOR PROJECT AND CURRICULUM DEVELOPMENT
CURRICULUM DEVELOPMENT DIVISION**

1. Academic unit offering the curricular component (Faculty, Center, Institute, Campus):

Center of Sciences

2. Department offering the curricular component (when applicable):

Physics Department

3. Undergraduate course(s) offering the curricular component

Code of the Course	Name of the Course	Course Degree ¹	Curriculum (Year/Semester)	Nature of the Component ²	Semester of Offer ³	Habilitation ⁴
91	Telecommunications Engineering	Bachelor	2015.1	Mandatory	05	-

4. Name of the curricular component:

Principles of Modern Physics

5. Code of the curricular component (filled by PROGRAD):

CD0241

6. Prerequisites	No ()	Yes (x)	
		Code	Name of the curricular component / activity
		TI0115	Applied Electromagnetism

7. Co-requisite	No (x)	Yes ()	
		Code	Name of the curricular component / activity

8. Equivalences	No ()	Yes (x)	
		Code	Name of the curricular component / activity
		TI0050	Applied Electromagnetism

9. Day period of the curricular component (more than one option can be selected):

- ¹ Fill with *Bachelor (Engineer), Licenciante, or Technologist.*
- ² Fill with *Mandatory, Optional, or Elective.*
- ³ Fill when mandatory.
- ⁴ When elective, fill with the habilitation or emphasis to which the curricular component is linked.

Morning Afternoon Night**10. Regime of the curricular component:** Semester Yearly Modular**11. Syllabus:**

Special relativity; Corpuscular properties of waves; Wave properties of particles; The atom; Quantum mechanics; Quantum theory of the hydrogen atom; The nucleus; Radioactivity.

12. Program:

1. The Michelson-Morley experiment, the special theory of relativity, time dilation, length contraction, Lorentz transformations, velocity sum, relativistic mass, mass and energy.
2. The photoelectric effect, the quantum theory of light, x-rays, Compton effect, pair production.
3. De Broglie's waves, particle diffraction, uncertainty principle, wave-particle duality.
4. Atomic models, alpha particle dispersion, Rutherford's dispersion formula, electronic orbits, atomic spectra, the Bohr atom, the correspondence principle.
5. Wave equation, Schrödinger equation, applications: particles in a box, harmonic oscillator.
6. Schrödinger equation for the hydrogen atom, quantum numbers, selection rules.
7. The neutron, stable nuclei, bonding energy, the liquid drop model, the layered model.
8. Radioactivity; radioactive series; alpha, beta & gamma decay.

13. Workload description

Number of Weeks:	Number of Credits:	Total Workload in Hours:	Theory Workload in Hours:	Practice Workload in Hours:
16	04	64	64	-

14. Basic bibliography:

- 1- Conceitos de Física Moderna (McGraw-Hill) Arthur Beiser.

15. Complementary bibliography:

- 1- Física Moderna (Guanabara Dois) Paul Tipler;
- 2- Curso de Física Moderna (Harla) Virgílio A. Costa, Clyde L. Cowan, B.J. Graham.