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	01	-

4. Name of the curricular component:
Fundamentals of Physics

5. Code of the curricular component (filled by PROGRAD)**:**
CD0327

6. Prerequisites — No ( ) — Yes (x)

Code	Name of the curricular component / activity

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
CD0290	Fundamentals of Physics

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

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1 **Fill with *Bachelor (Engineer), Licenciate,* 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.**

(x) Morning (x) Afternoon (x) Night

10. Regime of the curricular component:

( ) Semester (x) Yearly ( ) Modular

11. Justificatory for the creation/regulamentation of this curricular component

A large number of specific engineering disciplines have contents that have been developed on top of the basic principles of physics and its applications. These brief considerations already justify the need of the discipline of Fundamentals of Physics for the formation of the telecommunications engineer.

12. Objectives for the curricular component:

1. Provide the undergraduate student with a solid background on the main concepts and tools of Physics and their applications, which are necessary for the systematic and in-depth study of the theories of electromagnetism, electrical circuits, signals and systems, signal transmission, control and coding;
2. Introduce the use of mathematical tools of differential and integral calculus, through Newtonian mechanics and other pertinent materials, to the teaching of physics in the first year of higher education, which favor the learning of applications in the context of engineering graduation.

13. Syllabus:

Translational and rotational kinematics; translational dynamics; work; energy; linear momentum; conservation principles and collisions; the simple harmonic oscillator: free, damped and forced; progressive and stationary waves; fluids: principles of Pascal and Archimedes; continuity equations and Bernoulli's equation; heat; first law of thermodynamics; ideal gas; Carnot cycle; second law of thermodynamics and entropy.

14. Program:

1. INTRODUCTION: Physical quantities, vectors and scalars, decomposition and addition of vectors, multiplications of vectors.
2. MOVEMENT IN ONE DIMENSION: Particle kinematics, mean and instantaneous velocity, rectilinear motion with constant acceleration, mean and instantaneous acceleration, free falling bodies.
3. MOTION IN A PLANE WITH CONSTANT ACCELERATION: Movement in a plane with constant acceleration, movement of projectiles, uniform circular motion, tangential acceleration in the circular motion, relative speed and acceleration.
4. DYNAMICS OF THE PARTICLE: Newton's laws, applications, frictional forces, centripetal force.
5. WORK - ENERGY: Work of a constant force, work of a variable force, power, kinetic energy.
6. CONSERVATION OF ENERGY: Conservative and non-conservative forces, potential energy, conservative systems, energy conservation, mass and energy.
7. CONSERVATION OF THE LINEAR MOMENT: Center of mass, movement of the center of mass, linear momentum of a particle and of a system of particles, conservation of the linear momentum, applications.
8. COLLISIONS: Impulse and linear momentum, mechanical collisions in a plane, effective collision section.
9. Oscillations: The simple harmonic motion. Energy in simple harmonic motion. Applications. Relation between the simple harmonic motion and uniform circular movement. Superposition of harmonic motions. Oscillation of two bodies. Damped and forced oscillations. Resonance.

10. WAVES IN ELASTIC MEDIA: Mechanical waves. Progressive waves. The principle of superposition. Speed, power and intensity of a wave. Wave interference. Stationary waves. Resonance.
11. FLUID STATICS: Fluids. Variation of pressure in a resting fluid. Principles of Pascal and Archimedes. Measurement of pressure.
12. FLUID DYNAMICS: General concepts on the flow of fluids. Power lines. Continuity equation. Bernoulli's equation. Applications. Preservation of the moment in fluid mechanics.
13. TEMPERATURE: Macroscopic and microscopic descriptions. Thermodynamic equilibrium. Temperature measurement. The gas thermometer at constant volume. The thermometer scale of an ideal gas. Celsius and Fahrenheit scales. Thermal expansion.
14. HEAT AND THE FIRST LAW OF THERMODYNAMICS: Heat, a form of energy. Amount of heat and specific heat. Molar thermal capacity of solids. Heat conduction. Heat and work. First law of thermodynamics. Applications.
15. KINETIC THEORY OF GASES: Ideal gas: Microscopic and macroscopic definitions. Kinetic pressure calculation. Kinetic interpretation of temperature. Specific heat of an ideal gas. Equipartition of energy.
16. ENTROPY AND THE SECOND LAW OF THERMODYNAMICS: Reversible and irreversible transformations. The Carnot cycle. The second law of thermodynamics. The efficiency of machines. Entropy: Reversible and irreversible processes. Entropy and second law. Entropy and disorder.

15. Workload description

Number of Weeks:	Number of Credits:	Total Workload in Hours:	Theory Workload in Hours:	Practice Workload in Hours:
32	08	128	128	-

16. Basic bibliography:

1- Física – Resnick Halliday, Vol. I e II.

17. Complementary bibliography:

1- Sears Zemansky, Vol. I e II.