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 Technology

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

Teleinformatics Engineering 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	03	-

4. Name of the curricular component:
Basic Electromagnetism

5. Code of the curricular component (filled by PROGRAD)**:**
TI0113

6. Prerequisites — No ( ) — Yes (x)

Code	Name of the curricular component / activity
CB0664	Fundamentals of Calculus
CD0327	Fundamentals of Physics

7. Corequisite — 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)**:**
(x) Morning (x) Afternoon (x) Night

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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.**

10. Regime of the curricular component:

(x) Semester ( ) Yearly ( ) Modular

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

The electromagnetic phenomena are the basis for telecommunications engineering. This course aims at providing the fundamentals required to understand these phenomena and the mathematical models used in the characterization of the physical systems built upon these phenomena.

12. Objectives fo the curricular component:

Provide basic knowledge of electromagnetic theory required to understand the phenomena belonging to the areas of telecommunications and computer engineering.

13. Syllabus:

Electric charge and Coulomb's law. Stationary electric fields, field lines. Electric flux, Gauss's law in integral form. Electrostatic energy and potential. Insulator and conductor materials, capacitance. Biot-Savart's law and stationary magnetic fields. Magnetic materials. Inductance. Faraday's law in integral form. Maxwell's equations in integral form.

14. Program:

1. **Electric charge and Coulomb's law**: concept of electric charge, charge density, force between point charges, superposition principle.
2. **Electric field, field lines**: concept of electric field, electric field of a point charge and of n point charges, electric field of a line, of a surface, and of a volume of charges.
3. **Electric flux, Gauss's law in integral form**: Michael Faraday's experiment, electric flux density, Gauss's law and Gaussian surfaces, electric flux calculation.
4. **Energy and potential**: energy spent in moving a point charge under an electric field, electric potential and electric potential difference, electric dipole, energy spent to build a system of charges.
5. **Insulator and conductor materials, capacitance**: current, current density and current continuity, conductors and conductivity, Ohm's law and electric resistance calculation, polarization vector, capacitance, dielectric strength.
6. **Biot-Savart's law and stationary magnetic fields**: configurations of electric current, Biot-Savart's law and magnetic field for stationary electric current, Ampère's law in integral form, magnetic flux and magnetic flux density, magnetic vector potential.
7. **Magnetic materials and inductance**: magnetic force over a charge in movement and over an electric current, Hall effect and magnetic force among current conductors, torque under current loops and magnetic dipole, characterization of magnetic materials: diamagnetic, paramagnetic and ferromagnetic, magnetization, permeability and histeresys, magnetic circuits and inductance, force and potential energy in magnetic materials.
8. **Faraday's law in integral form**: Faraday's law of induction, Lenz's law, generators and transformers.
9. **Maxwell's equations in integral form**: displacement current, Maxwell's equations in integral form, Lorentz's force.

15. Workload description				
Number of Weeks:	**Number of Credits:**	**Total Workload in Hours:**	**Theory Workload in Hours:**	**Practice Workload in Hours:**
16	04	64	64	-

16. Basic bibliography:

1- Hayt, William H. Jr. – "Eletromagnetismo", 3rd edition, Livros Técnicos e Científicos.

2- HALLIDAY, David; WALKER, Jearl; RESNICK, Robert. Fundamentos de física: eletromagnetismo. 8. Ed. Rio de Janeiro, RJ: Livros Técnicos e Científicos, 2009.

3- Sadiku, Matthew N. O. – "Elementos de Eletromagnetismo", 3rd edition, Bookman, 2004.

17. Complementary bibliography:

1- Paul, Clayton R. Eletromagnetismo para engenheiros: com aplicações aos sistemas digitais e interferência eletromagnética. Rio de Janeiro: Livros Técnicos e Científicos, 2006.

2- Kraus, John D. and Carver, Keith R. – "Electromagnetics", 3rd edition, McGraw-Hill.

3- HALLIDAY, David; RESNICK, Robert; KRANE, Kenneth S. Física 3. 5. Ed. Rio de Janeiro, RJ: LTC, c2004.

4- Reitz, John R.; Milford, Frederick, J. and Christy, Robert W.; "Fundamentos da Teoria Eletromagnética", 3rd edition, Editora Campus.

5- Edminister, Joseph A. – "Eletromagnetismo". São Paulo: McGraw-Hill, c1980.

6- Macedo, Annita; "Eletromagnetismo", Editora Guanabara.

7- Paris, Demetrius T., Hurd, F. K.; "Teoria Eletromagnética Básica", Guanabara Dois, 1984

8- Quevedo, Carlos Peres; "Eletromagnetismo", Edições Loyola, 1993.