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:
Electric Circuits

5. Code of the curricular component (filled by PROGRAD)**:**
TI0114

6. Prerequisites — No ( ) — Yes (x)

Code	Name of the curricular component / activity
CB0664	Fundamentals of Calculus
CB0699	Applied Algebra I

7. Corequisite — No (x) — Yes ( )

Code	Name of the curricular component / activity

8. Equivalences — No ( ) — Yes (x)

Code	Name of the curricular component / activity
TI0054	Electric Circuits

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

For the majority of engineering courses, such as telecommunications engineering, the curriclar component of electric circuits is essential and constitutes a basis to approach and treat the fundamental principles que rule electric signals, components and systems. Electric circuits is one of the first contact point of the student with the professional exercise of engineering in areas like electronic, computer, automation and communication engineering. The course brings to the world of the student a new dimension: from now on, the problems do not have a single solution anymore. The student should use his/her knowledge of several analysis techniques, together with their physics and mathematics knowledge to identify the best way to obtain a solution for an engineering problem.

12. Objectives fo the curricular component:

1. Analyze the behavior of electric and electronic systems using models composed by idealized circuit elements.
2. Associate the mathematical equations of the model to the physical behavior of the real circuit being modeled.
3. Analyze the transient and steady states of direct current electric circuits supplied by linear energy sources.
4. Understand the physical meaning and the application of the time domain and frequency domain analyses, as well as the existing relationship between these two types of analysis.
5. Analyze the steady state of single-phase sinusoidal alternating current circuits.

13. Syllabus:

Circuit elements and circuit laws. Mathematical representation and solution of circuits using algebraic and matricial methods. Mathematical representation of dynamic circuits. Single-phase circuits. Steady state sinusoidal regime.

14. Program:

1. **Introduction/preliminary concepts** – Introduction and teaching plan discussion; definitions and units; electric charge and current, voltage, energy and power; Ohm's law; Bipole and physical representation of devices by models; Laboratory activities.

2. **Circuit elements and laws** – equivalent resistance; resistors in series and voltage divider; resistors in parallel and current divider; energy storage devices – capacitors and inductors; Association of capacitors/inductors; dependent and independent sources – series and parallel associations; maximum power transfer condition; circuit analysis methods: Kirchhoff's laws (node equations, loop equations and duality), superposition theorem, Thévenin and Norton theorems; Laboratory activities.

3. **Linear circuit modeling** – solution using differential equations; state variables; autonomous circuits: time-domain solutions; non-autonomous circuits: time-domain solutions; sources: constant, step and impulse; Laboratory activities.

4. **Single-phase alternating current circuits** – sinusoidal voltages and currents – cycle, period, frequency, angular frequency, phase, phase difference, peak, mean and effective values;

Relationships among sinusoidal voltages and currents in alternating current circuits with resistors, capacitors and indcutors; Phasor, impedance and admitance; steady state analysis of sinusoidal circuits – algebric solution in frequency domain; active, reactive and apparent power; Laboratory activities.

15. Workload description

Number of Weeks:	Number of Credits:	Total Workload in Hours:	Theory Workload in Hours:	Practice Workload in Hours:
16	06	96	64	32

16. Basic bibliography:

1- Burian Jr., Yaro; Lyra, Ana Cristina C. - Circuitos Elétricos, Pearson Prentice Hall, 2006.

2- Nilsson, James W; Susan A. Riedel - Electric Circuits, Prentice-Hall, 2000

3- Laboratory activities' script.

4- Macedo, Annita; “Eletromagnetismo”, Editora Guanabara.

17. Complementary bibliography:

1- Paris, Demetrius T., Hurd, F. K.; “Teoria Eletromagnética Básica”, Guanabara Dois, 1984.

2- Quevedo, Carlos Peres; “Eletromagnetismo”, Edições Loyola, 1993.

3- Dorf, Richard C. and Svoboda, James A. - Introduction to Electric Circuits - Editora John Wiley & Sons.

4- Van Valkenburg, Mac Elwyn - Network Analysis – Editora Prentice-Hall.

5- Close, Charles M. - Circuitos Lineares - Editora da Universidade de São Paulo.

6- Desoer, Charles A. and Kuh, Ernest S. - Teoria Básica de Circuitos - Editora Guanabara