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	Optional	-	-

4. Name of the curricular component:
Optoelectronic Devices

5. Code of the curricular component (filled by PROGRAD)**:**
TI0068

6. Prerequisites	No ( )	Yes (x)	
		Code	Name of the curricular component / activity
		TI0060	Electronic and Optoelectronic Materials

7. Corequisite	No (x)	Yes ( )	
		Code	Name of the curricular component / activity

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

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

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

Optical communications provide traffic conditions for rate transmissions in excess of gigabits / second. For this, it is necessary the knowledge and mastery of the parts that compose the systems, which depend on the passive and active opto-electronic devices. In this course, therefore, we intend to study the opto-electronic devices used in optical communications systems, sensors and optical meters.

12. Objectives fo the curricular component:

Provide the student with the conceptualization and understanding of the physics of optoelectronic components such as lasers, photodiodes and electro-optical modulators, as well as the design of communication, sensing and measurement systems that use them.

13. Syllabus:

Semiconductor Laser; Photo-diodes; Light Propagation in Anisotropic Medium; Nonlinear Optics; Electro-Optical Materials and Electro-Optical Modulators.

14. Program:

1. **Semiconductor Laser:** oscillation threshold condition, steady state solution of rate equations, spectral characteristic, pulsed modulation, analog modulation.
2. **Photo-diodes:** responsiveness, quantum efficiency, materials for photo-diodes, PIN photo-diode, avalanche photo-diode.
3. **Light propagation in anisotropic media:** birefringence and dichroism, Maxwell's equations, dielectric tensor, uniaxial and biaxial crystals, optically active materials. electro-optical-pockels effect, Kerr effect.
4. **Nonlinear Optics:** non-linear polarization, second harmonic.
5. **Electro-Optical Materials:** KDP, ferroelectric oxides, BaTiO3, LiNbO3, KTP, non-ferroelectric oxides, PZT ceramics, Langmuir-Blodgett films, nematic liquid crystals.
6. **Electro-optical modulators:** phase modulators, amplitude modulators and polarization modulators.

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- Electrooptics, Phenomena, Materials, Applications, F.A. Lopez, J.M. Cabrera, F.A. Rueda Academic Press (1994).

2- Laser Electronics, J. T. Verdeyen, Prentice Hall, 3rd edition (1995).

17. Complementary bibliography:

1- Materiais and Dispositivos Eletrônicos, S. M. Rezende, Livraria da Física, 2nd edition, (2004).

2- Quantum Electronics, A. Yariv, John Wiley and Sons (1989).