



# 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 <sup>1</sup>	Curriculum (Year/Semester)	Nature of the Component <sup>2</sup>	Semester of Offer <sup>3</sup>	Habilitation <sup>4</sup>
91	Telecommunications Engineering	Bachelor	2015.1	Optional	-	-

**4. Name of the curricular component:**

Optical Networks

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

TI0123

6. Prerequisites	No ( )	Yes (x)	
		Code	Name of the curricular component / activity
		TI0064	Optical Communications

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):

Morning       Afternoon       Night

<sup>1</sup> Fill with *Bachelor (Engineer), Licenciante, or Technologist.*

<sup>2</sup> Fill with *Mandatory, Optional, or Elective.*

<sup>3</sup> Fill when mandatory.

<sup>4</sup> When elective, fill with the habilitation or emphasis to which the curricular component is linked.

**10. Regime of the curricular component:** Semester Yearly Modular**11. Justificatory for the creation/regulamentation of this curricular component**

In the context of high capacity and high speed traffic, fiber optic networks play an essential role in establishing and maintaining data, voice and video communication.

**12. Objectives fo the curricular component:**

Provide the student with the conceptualization, understanding and mastery of various optical networks, as well as the ability to design projects and manage WDM and PONs networks based on optical fibers.

**13. Syllabus:**

Introduction to optical networks; SONET / SDH and IP networks; WDM network; control and management; network survival; passive optical networks; WDM network design; photonic switching.

**14. Program:**

1. **Introduction to optical fiber networks:** historical perspective, basic concepts.
2. **SONET / SDH and IP networks:** concepts, optical transport networks, Ethernet and IP networks.
3. **WDM networks:** concepts, optical line elements, multiplexers and cross-connectors.
4. **Control and management:** functions and protocols, performance management and failure.
5. **Network Survival:** protection in SONET / SDH networks, techniques of protection in the optical layer, interoperation between networks.
6. **Passive optical networks:** architectures, types, HFC and FTTC.
7. **WDM networks design:** architectures, LTD and RWA, load sizing models and traffics.
8. **Photonic switching:** OTDM, synchronization and switching techniques.

**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- KARTALOPOULOS, Stamatios V. Next Generation Intelligent Optical Networks: From Access to Backbone. Springer e-books Boston, MA: Springer Science+Business Media, LLC, 2008.
- 2- PRAT, Josep. Next-Generation FTTH Passive Optical Networks: Research Towards

Unlimited Bandwidth Access. Springer eBooks Dordrecht: Springer Science + Business Media B.V, 2008.

- 3- KAZI, Khurram (Ed.). Optical networking standards: a comprehensive guide. New York, NY: Springer, 2006.

#### **17. Complementary bibliography:**

- 1- HUBER, John C. Industrial fiber optic networks. Research Triangle Park: Instrument Society of America, 1995.
- 2- STERN, T. E.; ELLINAS, G.; BALA, K. Multiwavelength Optical Networks: Architectures, Design, and Control. 2nd edition, Cambridge University Press, 2008.
- 3- GREEN Jr., Paul E.. Fiber optic network, New Jersey: Prentice Hall, 1993.
- 4- AGRAWAL, Govind P.. Fiber Optic Communication Systems, Wiley Series and Optical Bacheloring (1997). ISBN-10: 0471215716.
- 5- Lasers and Electro-optics: Fundamentals and Bacheloring, Christopher C. Davis, Cambridge University Press. ISBN-10: 0521484030.
- 6- Optics and Photonics: An Introduction, F. Graham Smith, Terry A. King, Dan Wilkins, Wiley. ISBN-10: 047001783X.