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)**:**

Department of Organic and Inorganic Chemistry

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:
General Chemistry for Engineering

5. Code of the curricular component (filled by PROGRAD)**:**
CE0846

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

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 courses have contents that are related to materials and phenomena associated with the basic principles of chemistry and their applications. These brief considerations already justify the necessity of the discipline of General Chemistry for Engineering for the formation of the telecommunications engineer.

12. Objectives for the curricular component:

Provide the undergraduate student with a solid background on the key concepts and tools of chemistry and their applications, which are required for the systematic and thorough study of theories of electromagnetism, electronics and optoelectronics materials, microwave devices and circuits, among others.

13. Syllabus:

Study of the fundamental concepts of chemistry, mass and energy relationships in chemical phenomena, development of the atomic models, periodic classification and molecular structure with emphasis on solid state bonds. Discussion of equilibrium relationships and their applications in phenomena involving acids, bases and electrochemical systems, especially corrosion.

14. Program:

1. **Introduction:** Basic concepts; Importance of Chemistry; Elements, compounds and mixtures; Separation methods; Properties of matter; Identification methods.
2. **Stoichiometry:** Weight Laws; Dalton's atomic theory; Relative masses; Avogadro number, molar mass; Molar concentration; Minimum formula; Chemical equations; Mass relationships in reactions; Limiting reagent; Theoretical and real yield.
3. **Atomic structure:** Nature of matter; Atom components; Isotopes; Atom behavior; Nature of light; Bohr's model for the hydrogen atom; Particles and waves; Distribution of electrons in atoms: Quantum mechanics and the hydrogen atom.
4. **Periodic classification of elements:** Historical development; Modern periodic table; Metals and nonmetals; Elements of block s; Elements of block p; Some transition elements; Atomic properties: size, ionization energy, affinity, electropositivity; Trend of atomic properties.
5. **Chemical bonds:** Ion Bonding; Covalent bond; Lewis' structure; Resonance; Formal Load; Molecular geometry and polarity; Hybrid orbitals; Molecular orbitals; Metallic connections.
6. **Structure and bonds in solids:** Crystalline structure; Unit cell; Crystal bonds; Defects in solids; Physical properties and structures; Phase diagram.
7. **Water and solutions:** Ways to express concentration; Principles of solubility; Colligative properties of electrolyte and non-electrolyte solutions; Natural sources of water; Water pollution; Water purification.
8. **Kinetic and chemical equilibrium:** Equilibrium constant; Applications of the equilibrium constant; Effect of variations in conditions on equilibrium position; Factors that influence the speed of reaction.
9. **Acids and bases:** Dissociation of water; Nature of acids and bases; pH scale; Strong and weak acids and bases; Acid-base properties of saline solutions; Acid-base titration; Buffer solution.
10. **Oxidation and reduction:** Electrochemical cells; Introduction to electrochemistry; Oxidation and

reduction reactions; Galvanic cells; Standard potentials; Corrosion of metals.

15. Workload description				
Number of Weeks:	**Number of Credits:**	**Total Workload in Hours:**	**Theory Workload in Hours:**	**Practice Workload in Hours:**
32	06	96	96	-

16. Basic bibliography:

1- Masterton, W.L., Slowisnki, E.J. e Stanitski, C.L. - Princípios de Química, 6a. ed., Ed. Guanabara, 1990.

2- Kotz & Treichel, Química e Reações Químicas, 3ª ed., vol. 1 e 2, Ed. LTC – Livros Técnicos e Científicos Editora S.A, 1998.

3- Chang, R., Química, 5ª ed. Mc Graw Hill, 1998.

17. Complementary bibliography:

1- Chang, R., Chemistry, 6ª ed., McGraw-Hill, 1998.

2- Atkins, P. e Jones L., Chemistry Molecules, Matter and Change, 3ª ed., Freeman, 1997.

3- Limland, J.B. e Bellama, J.M., General Chemistry, 2ª ed., West, 1996.

4- Fine, L.W.; Beall, H., Chemistry for Engineers and Scientists, Saunders College Publishing, 1990.

5- Brady, J.E e Holum, J.F., Chemistry, The Study of Matter and its Changes, Jonh Wiley & Sons, 1993.

6- Olmsted, J. e Williams, G.M.; Chemistry, the Molecular Science, Mosby, 1994.

7- Atkins, P.W. e Beran J.A, General Chemistry, 2ª ed., Scientific American Books, 1992.