



## Course Unit: 9853315 – Fundamentals of Physics and Chemistry

<b>Year 1</b>	<b>Semester 2</b>	<b>ISCED Code: 441/442</b>	<b>ECTS: 6</b>
<b>Type of Course Unit: Compulsory</b>	<b>Delivery Mode: Face-to-face</b>	<b>Language of Instruction: Portuguese</b>	

**COURSE COORDINATOR: António Carloto**

### HOURS OF WORK

TOTAL HOURS	Contact Hours								Hours in autonomous work
	Theory	Theory and practice	Practical and laboratory work	Field work	Seminar	Internship	Tutorial guidance	Other	
150	30	20	20				5		75

### LEARNING OUTCOMES (knowledge, skills and competence)

- 1 - Acquire a solid scientific culture in the fields of Physics and Chemistry ;
- 2 - Know how to interpret /explain common everyday situations, based on the knowledge of Physics and Chemistry;
- 3 - Be able to establish relations among the different areas of Science;
- 4 - Improve the understanding of the natural phenomena and of the scientific and technological advancements;
- 5 - Understand and apply the scientific method correctly in the explanation of the scientific phenomena;
- 6 - Develop skills and habits related with scientific and pedagogical work.
- 7 - Develop a scientific stance;
- 8 - Improve the interest for Science.

### CONTENTS

- 1 - Physical quantities: Basic concepts.
- 2 - Atomic and nuclear structure.
- 3 - Chemical bonds and molecular structure; Solutions and their properties.
- 4 - Acid-base reactions and acid-base equilibrium; precipitation reactions and solubility balance; oxidation-reduction reactions.
- 5 - Organic Compounds and biomolecules.
- 6 - Forces and motion: Basic concepts.
- 7 - Work and energy: Energy conservation and degradation; kinetic, potential and mechanical energy; work and heat as measurements for transferred energy.
- 8 - Electricity: Electrostatics; notion of electric current; direction and intensity; electric resistance of a linear conductor; Ohm's law; simple electric circuits.
- 9 - Wave phenomena: Light and associated phenomena; reflection, diffraction and refraction of light and their laws; mirrors and lenses; sound.

### DEMONSTRATION OF THE CONTENTS COHERENCE WITH THE COURSE UNIT'S LEARNING OUTCOMES

In this curricular unit the basic concepts of chemistry and physics will be covered. An integrated perspective of the various contents will be used, in order to contribute to a deep understanding of the natural phenomena related to both sciences. The definition of the syllabus of this curricular unit intends to contribute to basic scientific training needed for the future graduates in basic education.

In compliance with the DL n.º 79/2014 art. 13º, this Curricular Unit arises in the context of “Teaching Training” integrating the minimum 31 credits, in the area of Teaching Training, required to access the master's degree, necessary to exercise the teaching profession.

### **TEACHING METHODOLOGIES**

Presentation (using the most diversified means: oral, written and multimedia) of core ideas which are indispensable to the teaching/ learning process of theoretic knowledge.

Various types of practical coursework: laboratorial practice, field trips.

Bibliographic research work, scripto and on-line, in specific areas, in order to accomplish group and written assignments, to be presented and discussed in the class as whole.

### **DEMONSTRATION OF THE COHERENCE BETWEEN THE TEACHING METHODOLOGIES AND THE LEARNING OUTCOMES**

Given the regulatory profile of the Early Childhood Educator and Teacher of the 1st and 2nd cycles, the 79/2014 of 14 May and the specificities of this Curricular Unit, the methodologies employed privilege the scientific contents, without neglecting an educational component, ensuring the applicability of these concepts in the context of future professional activity of students.

Considering that this group of professionals will be one of the fundamental pillars of the formation of new generations, these methodologies are also intended to provide these students with skills in critical thinking and autonomy, that enhance the taste and the permanent need for improvement and updating through lifelong learning.

### **EVALUATION METHODS**

Continuous assessment: evaluation of the research work carried out, as well as of the practical competences acquired in the practical coursework.

Written summative assessment procedures.

### **MAIN BIBLIOGRAPHY**

- ALONSO, M. e FINN, E. J. (1999). *Física*. Addison -Wesley Longman Ltd.
- CHANG, R. (1994). *Química Geral. 5ª Ed.*, McGraw Hill. Lisboa.
- GIFFORD, C. (1994). *Guia essencial de Química*, Editorial Presença.
- HALLIDAY, D., RESNICK, R., & WALKER, J.(2005) *Fundamentals of Physics 7ª Ed.* Wiley & Sons, New York.
- NORBERTO, M.F. et al. (2000). *Guia do Laboratório de Química e Bioquímica*, 1ª Ed., Lidel. Lisboa.
- RUSSEL, J.B. (2000). *Química Geral. 2ª Ed.*, Makron Books, 2 Volumes. São Paulo.
- SNYDER, C. H. (1998). *The extraordinary chemistry of ordinary things*, John Wiley and Sons, inc.
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Year of implementation: 2011/2012 | Date of approval by the Technical-Scientific Board: 2015-09-01