Program	09TT- Engineering in Telecommunication Technologies and Services

Course number and name	
Number	95000097
Name	Quantum Information and Computation Información y Computación Cuánticas
Semester	Y3-S6

Credits and contact hours	
ECTS Credits	4.5
Contact hours	54

Coordinator's name	Pedro Jesús Salas Peralta

Specific course information		
Description of course content		
The aim of the course is to provide a general theoretical and technological overview of the field of quantum information. To achieve this, conceptual as well as mathematical tools are provided during the course.		
List of topics to be covered		
1. Introduction to quantum mechanics, 2. Representation of quantum information, 3. Quantum communication, 4. Quantum cryptography, 5. Quantum computation, 6. Quantum algorithms, 7. Quantum error correction.		
Prerequisites or co-requisites		
None, except general background on quantum physics, algebra and classical physics.		
Course category in the program		
__ R (required)	**__X E (elective)**	**__ SE (selective elective)**

Specific goals for the course
Specific outcomes of instruction
RA246 - Obtain an overview of the advantages and drawbacks of quantum mechanics related to the information representation and processing. RA247 - Learn and handle the theoretical tools (mathematical) that help to describe the representation and processing of the quantum information. RA248 - Know the current technologies related to quantum information processing. RA249 - Solve problems using the concepts of quantum information theory.

Student outcomes addressed by the course
CG1-13 CEB3 CECT1, CECT3

Bibliography and supplemental materials
- M. A. Nielsen and I. L. Chuang. Quantum computation and quantum information, 4ª edn., *Ed.* Cambridge University Press, 2011. - J. Stolze and D. Suter. Quantum Computing, Ed. Wiley-VCH, Weinheim, 2004. - P. Kaye, R. Laflamme y M. Mosca; An Introduction to Quantum Computing, Ed. Oxford University Press, 2007. - Giuliano Benenti, Giulio Casati, Giuliano Strini; Principles of Quantum Computation and Information: vol.1 y 2, Ed. World Scietific, 2004. - Dirk Bouwmeester, Artur K. Ekert, Anton Zeilinger, The Physics of Quantum Information: Quantum Cryptography, Quantum Teleportation, Quantum Computation, Ed. Springer, 2001. - Noson S. Yanofsky and Mirco A. Mannucci, Quantum Computing for Computer Scientists, Ed Cambridge University Press, 2008. - Vlatko Vedral, Introduction to Quantum Information Science, Ed. Oxford University Press, 2006 .

Teaching methodology			
_X_ **lectures**	_X_ **problem solving sessions**	_X_ **collaborative actions**	__ **laboratory sessions**
Other:			