Quantum Computing and Cryptography - 04: Complex Vector Spaces

Length	Micromodule
Collection	NSA NCCP
Updated	March 14, 2019
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Academic Levels	Undergraduate, Graduate
Topics	Quantum Computing
Link	https://clark.center/details/aparakh/b0283e43-7522-4ccc-b416-c6bbd3d30df1

Description

This lesson covers part of the background students need about Complex Vector Spaces that is relevant to quantum computing and cryptography. Students will learn the concept and definition of complex vector spaces, operations in them and some of the properties. Students will extend the definition to include matrix operations and write programs to implement some of the operations.

Email Dr. Abhishek Parakh at aparakh@unomaha.edu for solutions to the problems.

Note: To get started with Jupyter notebooks please follow the userguide available at: https://sites.google.com/unomaha.edu/userguideqcl/

Notes

For solutions for Final Quizzes please contact Dr. Abhishek Parakh at aparakh@unomaha.edu.

Outcomes

- Describe the concept and definition of Complex Vector Spaces.
- Implement programs that performs addition, multiplication, transpose, conjugate and dagger operations on vectors and matrices.
- Prove properties of Complex Vector Spaces and operations.
- Practice basic operation in Complex Vector Spaces.
- Practice matrix operations and understand and use their properties.

Alignment

The standards and guidelines this learning object is mapped to

- CAE Cyber Ops (2014) - Discrete Math: Given an algorithm determine the complexity of the algorithm and cases in which the algorithm would/would not provide a reasonable approach for solving a problem
- NICE Workforce Knowledge (2017) - K0052: Knowledge of mathematics (e.g. logarithms, trigonometry, linear algebra, calculus, statistics, and operational analysis).

Links

External links that are associated with this learning object

- User guide