QUANTUM INFORMATION SCIENCE & ENGINEERING

MINOR

Quantum information science is an interdisciplinary field that seeks to understand the analysis, processing, and transmission of information using quantum mechanics principles. It combines the study of Information science with quantum effects in physics. This includes theoretical issues in computational models and more experimental topics in quantum physics, including what can and cannot be done with quantum information.

The idea of utilizing quantum mechanics to process information has grown from computation and communication to encompass diverse topics such as sensing and simulations in biology and chemistry. In addition to the extensive experimental efforts to build controllable large-scale quantum devices, theory research in quantum information investigates several themes which include computation, communication, precision measurement, and fundamental quantum science.

The Quantum Information Science & Engineering minor teaches students about a growing field of science and technology, combining and drawing on the disciplines of physical science, mathematics, computer science, and engineering. Its aim is to understand how certain fundamental laws of physics discovered in the last century can be harnessed to dramatically improve the acquisition, transmission, and processing of information. The exciting scientific opportunities offered by this field of study are attracting the interest of a growing community of scientists and technologists, and are promoting unprecedented interactions across traditional disciplinary boundaries.

Advances in this field are projected to become increasingly critical to our national competitiveness in information technology during the coming century.

This minor offers an opportunity for all Virginia Tech students, regardless of major, to learn and apply fundamental concepts related to quantum information science.

Core Requirements

MATH 2114 Elementary Linear Algebra *or 3144 Linear Algebra I*

PHYS 2254 Hello Quantum World!
PHYS 4254 Quantum Information Technologies
PHYS 4264 Quantum Optics and Qubit Processors *or CS 4134 Quantum Computation and Information Processing*

CHEM/PHYS 3684 Quantum Software I
CHEM/PHYS 4684 Quantum Software II

Restricted Elective Choices

PHYS 3314 Intermediate Laboratory, 3324 Modern Physics or 3406 Intermediate Electricity and Magnetism

CS 3114 Data Structures and Algorithms

CMDA/CS/STAT 3654 Introduction to Data Analytics and Visualization

CHEM 3616 Physical Chemistry

ECE 2024 Circuits and Devices

And Many More!

http://www.ais.science.vt.edu/