

## Quantum Information Systems

Quantum Information Science (QIS) is a multi-disciplinary approach combining the physical sciences, mathematics, computer science, and engineering to use the laws of quantum mechanics governing the sub-atomic world to improve the processing of information. Born out of contemplating the implications of quantum mechanics to the standard Turing computing machine, the impact of this new paradigm of information processing have already been transformative in terms of basic science, and it is expected that the impact of quantum technologies on society will be profound. The University of New Mexico (UNM) has been a pioneer in the QIS field for over 25 years, housing one of the longest-standing research programs. Our program aims to equip the next generation of quantum engineers with the necessary tools to help usher in a new era of quantum innovation.

**Area Chair:** Prof. Tameem Albash

### **Faculty Members:**

Prof. Tameem Albash ( <https://www.unm.edu/~talbash/> )

Prof. Milad Marvian ( <https://www.unm.edu/~mmarvian/> )

### **Required courses:**

1. ECE 595: Introduction to Quantum Information Science
2. ECE 595: Quantum Error Correction
3. ECE 537: Foundations of Computing
4. At least one from PHYS 566, PHYS 581, PHYS 571, PHYS 572, CHEM 567

### **Recommended courses:**

1. PHYS 571: Quantum Computation
2. PHYS 572: Quantum Information Theory
3. PHYS 566: Quantum Optics I
4. PHYS 581: Quantum Optics II
5. CHEM 567: Quantum Computing for Quantum Chemistry
6. ECE 500 Theory of Linear Systems
7. ECE 506 Optimization Theory
8. ECE 517 Machine Learning
9. ECE 520 VLSI Design
10. ECE 522 Hardware/Software Codesign with FPGAs
11. ECE 524 Network Economics
12. ECE 533 Digital Image Processing
13. ECE 536 Computer Software Systems
14. ECE 538 Advanced Computer Architecture
15. ECE 539 Digital Signal Processing
16. ECE 540 Advanced Networking Topics
17. ECE 541 Probability Theory and Stochastic Processes
18. ECE 542 Digital Communications Theory

19. ECE 549 Information Theory and Coding
20. ECE 595 Advanced Machine Learning
21. ECE 633 Advanced Topics in Image Processing

Other courses delivered as Special Topics (ECE 595) may become available per semester. Please contact the Area Chair or the faculty members for further information.