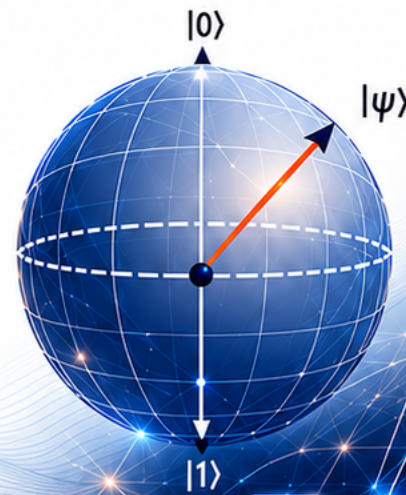


# FUNDAMENTALS OF QUANTUM INFORMATION SCIENCE



1-CREDIT COURSE



ONE CLASS  
PER WEEK



FALL 2026






An accessible introduction to qubits, superposition, measurement, interference, entanglement, quantum algorithms, cybersecurity, and the future of quantum technologies. Designed to inspire curiosity and build a strong conceptual foundation without requiring prior quantum background.

## COURSE CONTENTS

- 1 Why Quantum Information Science?
- 2 From Bits to Qubits: Superposition
- 3 Measuring a Qubit
- 4 The Minimum Math for Qubits
- 5 Quantum Gates and Circuits
- 6 Interference I: When Possibilities Collide
- 7 Interference II: Using Interference to Compute
- 8 Two Qubits and Controlled Operations
- 9 Entanglement I: Bell States and Quantum Correlations
- 10 Entanglement II: Beyond Classical Correlation
- 11 No-Cloning and Quantum Information
- 12 Quantum Teleportation
- 13 Quantum Algorithms: Search and Hidden Structure
- 14 Quantum Computing and Cybersecurity
- 15 Quantum Technologies and the Future

## HANDS-ON EXPERIENCES



-  **Lab 1:** First Quantum Circuit
-  **Lab 2:** Bell Circuit
-  **Demo:** Play with a Real Quantum Computer (cloud access)

## COURSE PROMISE



- ✓ Fundamental understanding of core quantum information concepts
- ✓ Conceptual insights with real-world connections
- ✓ Play with a real quantum computer
- ✓ Lightweight, hands-on exploration
- ✓ No prior quantum background required

INSTRUCTOR

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**COMPUTER SCIENCE**  
THE UNIVERSITY OF TEXAS AT EL PASO