



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Quantum Circuits and Algorithms

## CSE 2371

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

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**Course Description:**

Designed to provide students with a broad introduction to quantum computing, the future of computing. Using tools such as QBraid, students from diverse backgrounds will visualize quantum computing concepts and compare them with classical computing models. This will enable the comparison of quantum algorithms and their advantages over corresponding classical algorithms.

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**Prerequisites and Co-requisites:**

Pre or Co-requisite - ranks 2, 3, or 4

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**Course Goals / Objectives:**

- Master quantum literacy through the use of language and terminology in the field of quantum logic and quantum computing.
  - Master applying existing quantum algorithms, to achieve quantum speedup and error correction.
  - Master in developing competency in self-guided learning in the field of quantum computing.
  - Be competent with creating and interpreting circuit diagrams using python scripts.
  - Be familiar with the soft skills necessary to complete programming, assignments, activities, and the capstone team project.
  - Be familiar with knowing the similarities, and differences, between classical and quantum states and gates.
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**Course Topics:**

- Numbering Systems, Classical Logic, and Gates
  - Quantum Foundations, quantum states, and their measurement
  - Quantum Logic and Gates
  - Study of quantum algorithms
  - Quantum Noise and Error correction
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**Designation:**

Elective