

**University of Southern California
VITERBI SCHOOL OF ENGINEERING**

Master of Science in Quantum Information Science

Program Learning Objectives

The USC Master of Science in Quantum Information Science (MSQIS) program aims to train engineers and scientists in the fundamentals of quantum information and quantum computation, with expertise both in the foundations of quantum information science and in its practical development and application. This degree program, while based in the USC Viterbi School of Engineering, includes courses in Engineering, Physics, Chemistry and Computer Science. Graduates may go on to find industrial employment in the emerging (and rapidly growing) field of quantum technology, or to advanced graduate studies and academic research in the field.

After completion of the USC Master of Science in Quantum Information Science, students will be able to:

- Demonstrate a broad understanding of the fundamental principles of quantum information processing, including quantum computing and quantum communication, quantum error correction, and quantum metrology, and how quantum phenomena such as superposition, interference and entanglement can be exploited to carry out information-processing tasks.
- Display familiarity with the main quantum technologies under development and their physical realizations, such as superconducting chips, ion traps, and photonic systems.
- Design and program quantum computer algorithms to run on current small-scale quantum processors being developed by industrial companies (such as IBM, Google, Rigetti, IonQ and D-Wave).
- Apply quantum techniques to classically hard problems such as simulation of quantum systems and key distribution.
- Demonstrate knowledge of the current challenges to the development of quantum technology, and the necessary research and design improvements needed to achieve scalable quantum systems.