

# Quantum Optics and Quantum Information

## ECEE 498/591, Spring 2022

Instructor: Dr. Kanu Sinha

**Course Description:** This course provides a basic introduction to quantum optical phenomena and their applications to quantum information technology. The purpose of the course is to introduce students to the concepts of quantum physics from the perspective of developing the state-of-the-art quantum technologies. Topics covered include: introduction to quantum bits and quantum nature of light, quantum states of light, optical tests of quantum mechanics, non-linear optical phenomena, quantum entanglement, quantum teleportation, EPR paradox, Bell's inequalities, quantum eraser, quantum computing, quantum sensing, and quantum metrology.

**Projects:** There will be regular problem sets and a final course term paper where students will simulate the results of recent quantum optics/quantum information experiments based on the theory covered in the course.

**Recommended books:** Introductory Quantum Optics by C. C. Gerry and P. L. Knight, Quantum Optics: Taming the Quantum by P. Meystre, Modern Quantum Mechanics by J. J. Sakurai.

**Pre-requisites:** The course requires an understanding of Classical Electrodynamics, familiarity with quantum mechanics is helpful but not critical.