Classical and Quantum Information Theory
Fall 2022 Course Syllabus
Instructor: Li Gao

COURSE INFORMATION

Course number: MATH 4397-01 (24332) for undergraduate
MATH 6397-05 (24333) for graduate
Time: MWF 12pm-1pm, face to face lecture.
Location: S 116
Textbook: *Quantum Computation and Quantum Information*, by I. Chuang and M. Nielsen
The Theory of Quantum Information, by John Watrous
Quantum information theory, by Mark Wilde

Prerequisite: For undergraduate, Math 3338 Probablity & Math 4377 Advanced Linear Algebra. Quantum Mechanic will be appreciated but not required.

INSTRUCTOR DETAILS

Instructor: Li Gao
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OVERVIEW

Information theory is the scientific study of the quantification, storage, and communication of digital information. It has been widely used in the communication and cryptography in our daily life. In last several decades, motivated by quantum computation, quantum information theory has been a rapid growing area studying how information can be processed, transmit and stored in quantum mechanics system.

The aim of this course is to give a minimal introduction to both classical and quantum information theory in a unified manner. We will start with some basics in Shannon's classical information theory and then study their counterpart in quantum mechanics model. After that, we will focus on the quantum side and covers some selected topics such as entanglement, Bell's inequality, Shor's algorithm, Quantum Teleportation and Superdense coding, etc.

Prerequisites for this course will be solid background on Probability and Linear algebra. Knowledge on Quantum Mechanic will be appreciated but not required.