

Fall 2023, MA 591-002 Special Topics

Algebraic aspects of quantum computing

TuTh 1:30PM - 2:45PM, SAS Hall Room 1218

Instructor: Bojko Bakalov <bojko_bakalov@ncsu.edu>

Prerequisites: MA 405 (Linear Algebra) and MA 407 (Modern Algebra)

Description: The course will cover intermediate-level topics in quantum computing, such as the hidden subgroup problem, stabilizer codes, and dynamical Lie algebras. These will be used as a motivation to develop the relevant algebraic concepts, including groups, Lie groups, Lie algebras, and their representations. The course is aimed at students in mathematics, physics, computer science and engineering, who want to learn more advanced topics in quantum computing and the rigorous mathematical background needed for their deeper understanding. Although this course is not an introduction to quantum computing, it is possible to take it without prior knowledge of the subject.

Homework will be assigned regularly and will be collected weekly. You can expect 1-2 problems per week.

Project: At the end of the course every student will have to write a short paper and give a presentation on a topic related to but not covered in the lectures. The topics will be chosen about a month in advance in consultation with the instructor.

Grades will be based on the homework (50%), paper (25%), and presentation (25%).