

Fall 2025

PHYS 570

## Fusion categories for physics

Tuesday/Thursday 9:00AM-10:15AM in PHYS 234

Instructor: Colleen Delaney

Fusion categories are algebraic objects that have exciting applications in condensed matter theory, high-energy theory, topological quantum computation, and quantum error correction. Come get trained in how to work with them and learn about recent developments in theoretical physics. This course is open to advanced undergraduates and graduate students.

**Prerequisites:** Proof-based linear algebra and quantum mechanics. Optional but highly desirable: courses in abstract algebra, quantum computation.

### Topics:

- anyons and (2+1)D topological order
- state-sum TQFTs
- topological quantum computation
- fusion category symmetries of (1+1)D QFT
- the toric code and quantum error correction
- anyon chains and (1+1)D conformal field theory



**BoilerClasses link:**

<https://boilerclasses.com/detail/PHYS57000FusionCategoriesForPhysics>