This course will discuss some algebra and topology involved in quantum field theory.

Topological quantum field theory provides a categorical framework for the study of topological manifolds and their invariants. It is related to tensor structures in higher category theory. The course will focus on the 3-dimensional case, where the corresponding categorical structures include braided and modular tensor categories. The main examples (Witten, Reshetikhin-Turaev) are given by simple Lie algebras (via quantum groups).

Conformal field theory is a significantly more constrained structure, taking into account manifolds with a conformal structure. We will discuss the case of dimension 2, and explain how the genus 0 part of the theory is connected to 3-dimensional topological theories. The main examples come from affine Lie algebras (Wess-Zumino-Witten).