Within the last 30 years, a variety of sophisticated techniques from group theory, topology, and other branches of mathematics have been applied to the study of music. Students in this seminar will explore some of these exciting developments.

The concepts fundamental to this exploration are the spaces in which musical objects reside and transformations defining relationships among objects in those spaces. Familiar examples of musical spaces include pitch space and pitch-class space; there are also chordal spaces, rhythmic spaces, and many others. Spaces can be finite or infinite, discrete or continuous, chromatic or diatonic. Many musical spaces have appealing geometric representations. Transformations are mappings defined on spaces (what mathematicians call “functions”); examples include the familiar transposition and inversion operators. As David Lewin has shown, transformations are intimately related to a generalized notion of the interval between two musical objects.

Our study will cover essential concepts in the areas widely known as transformation theory and neo-Riemannian theory. There will also be some intersections with the recently burgeoning field of geometric music theory, as well as with diatonic set theory (which explores the subtle and complex relationships between diatonic and chromatic spaces) and, more broadly, scale theory. The primary subject matter is more theoretical than analytical in nature, but our readings will include analytical applications to a variety of repertoires, both tonal and atonal, and individual projects will offer an opportunity for students to pursue further analytical work.

Readings: A portion of the seminar will be structured around chapters from the instructor’s book manuscript in progress. Other assigned readings may include work by Lewin, John Clough, Richard Cohn, Steven Rings, and Dmitri Tymoczko.

Requirements: Requirements for the seminar will include assigned readings and discussion; additional individually selected readings and class presentations; one or two short papers or other written assignments; and one major paper and final presentation.

Prerequisites: Students enrolling in this seminar should be familiar with the fundamentals of pitch-class set theory as covered, for example, in T556, Analysis of Music Since 1900. There are no specific mathematical prerequisites other than a willingness to engage in rigorous, precise thinking; mathematical concepts will be introduced as needed during the semester.