

Mathematics and Music  
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Abstract  
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Have you ever wondered if the relationship between mathematics and music extends to the composition and interpretation of musical works? If you have, then this course is for you.

A central concern of music theory is to find a good way of hearing a piece of music and to communicate that way of hearing. Music theorists often draw upon mathematics to create conceptual categories towards this end. In recent years, basic tools from group theory, combinatorics, and topology have entered the realm of musical analysis, especially in the work of David Lewin and Rick Cohn.

We will explore these developments by drawing on examples from Bach, Bartók, Beethoven, Debussy, Hindemith, Schoenberg, Schumann, Wagner, and the Beatles. For mathematicians, one of the most surprising discoveries was perhaps the presence of a certain topological structure in Beethoven's Ninth Symphony. This is especially surprising when one considers that Beethoven composed this work over 70 years before Henri Poincaré initiated the study of topology! This topological structure will be revealed in the course of the lectures.

The ability to read music is not a prerequisite, since we aim to see and hear mathematics in action.