



Are you interested in both  
science and art?

Announcing a new course to be offered in the Spring of 2002 . . .

# Math & Music

Math 109 / Music 109M

This course is a study of interrelationships between mathematics and music using many aural examples and demonstrations. Although intended for students having an interest in both math and music, no advanced knowledge of either subject is assumed. The course will review basic musical and mathematical concepts as they are encountered. It will explain equal temperament, relate the chromatic scale it to modular arithmetic, and show why the musical staff is like a logarithmic scale for pitch. It will explain how overtones are related to the integers and show how harmony derives from the overtone series. It will identify the mathematical relationships between pitches in consonant intervals and chords, and discuss the historical obstacles (going back to Pythagoras) to tuning a musical scale which gives mathematically precise harmony in all keys. The student will be introduced to methods for overcoming the age-old problem of tuning and listen to performances played in just intonation and other types of non-standard tunings. The relationship between musical tones and periodic functions will be explained, showing how a tone's timbre is determined by its harmonics, and how this relates to trigonometry. Tones produced by instruments and the human voice will be analyzed. Musical examples ranging from Tibetan throat singing to American jazz will be played in class to demonstrate such things as overtones, chords, timbres, and tuning. If the class size permits, some assignments and exercises may involve the use of the computer (no previous computer experience is required) and/or synthesizer, allowing students to analyze musical tones, create new sounds, and do some beginning composing using new methods of tuning and sound generation. The course is designed to enhance and integrate the students' artistic and analytic skills. *This course satisfies the quantitative requirement.*

Prerequisite: High school algebra, trigonometry, and familiarity with basic music notation.

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