

025:250 COMPOSITION: ELECTRONIC MEDIA I

Nov. 14, 2005

Music and Mathematics

1. Pythagorean Origins

2. Tuning Theory
 - a. Pythagorean
 - b. Just intonation
 - c. Meantone
 - d. Equal temperament

3. Golden Section and Fibonacci numbers

4. Abstract Mathematics
 - a. Modulus and equivalence class

 - b. Sets
 - i. Unordered sets
 - ii. Ordered sets
 - iii. Subsets

 - c. Groups

 - d. Cartesian Products

 - e. Subgroups

 - f. Product groups

 - g. Group tables

5. Morphisms
 - a. Homomorphism
 - b. Epimorphism
 - b. Isomorphism
 - c. Automorphism

6. Permutations
 - a. Fixed
 - b. Interchanged
 - c. Symmetric Group S_n .
 - d. Subgroups of S_n .
7. Operations on pitch-classes
 - a. Transposition
 - b. Inversion
 - c. Retrograde
 - d. Multiplicative
 - e. Combinations
8. Applications to symmetric scales
 - a. Modes of limited transposition:
 - i. chromatic scale
 - ii. whole-tone scale
 - iii. diminished-seventh chord
 - iv. augmented triad
 - v. tritone
 - b. Applications to 12-tone rows
 - i. Hexachordal and trichordal combinatoriality
 - ii. Group actions on hexachords and trichords
 - iii. 12-tone arrays
 - iv. Dyadic invariance under complementary intervals of transposition.
9. Applications to other parameters
 - a. Rhythm
 - b. Instrumentation
 - c. Timbre
 - d. Articulation
 - e. Dynamics