

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
SYLLABUS (Tentative)
MATH 105 – Liberal Arts Mathematics: Music and Mathematics

OBJECTIVES: To introduce students to some of the many connections between mathematics and music, and to explore mathematical questions that follow naturally from standard musical considerations such as intonation, melody, harmony, rhythm, and variation.

INTENDED FOR: Liberal Arts Majors, particularly those with an interest in music.

PREREQUISITES: High School Algebra II or a college algebra course. *(Some experience with music – in particular, the ability to read music from a staff – is preferred, but it is not a strict requirement for this course.)*

TEXT: None (handouts will be provided by the instructor; no textbook purchase is necessary)

TECHNOLOGY: A basic scientific calculator (not necessarily a graphing calculator) that handles exponents and logarithms. (This type of calculator usually costs between \$10 and \$20. DO NOT invest a large amount of money in a calculator if it is to be used only for this class.)

Topics	Weeks
Tuning Systems Pitch; frequency; frequency ratios; octaves and other intervals; the twelve-tone scale; Pythagorean tuning; just intonation; equal temperament; alternate divisions of the octave	3
The Group of Musical Variations Transpositions; retrogrades; inversions; musical operations; modular arithmetic; groups and subgroups	3
Change Ringing and Permutations Change-ringing; permutations; the symmetric group	3
Counting The Multiplication Principle; permutations and combinations; counting melodies, chords, and rhythms; sequences and recursion; the Fibonacci (or Hemachandra) sequence and other recurrence relations	4
Tests, Review & Other Activities	1
Additional Topics (as time permits) Patterns in music; time signatures; randomized music; music and geometry; electronic music	

EVALUATION
Tests: 30-40%
Final Exam: 35-45%
Homework: 10-15%
Project: 15-25%