Salisbury University Department of Mathematical Sciences

MATH 105 : Liberal Arts Mathematics: Music and Mathematics
Syllabus (Tentative)

Description: Study of the beauty and structure of mathematics, with emphasis on quantitative and analytical reasoning skills. Various areas of mathematics or its applications will be used as a vehicle for this study. Designed for students whose major area of study does not have specific requirements in mathematics. 4 Hours Credit: Meets 4 hours per week. Meets General Education IVB or IVC.

Prerequisites: Three years of high school mathematics including geometry or college-level intermediate algebra.

Intended Audience: Liberal Arts Majors, particularly those with an interest in music.

Objective: 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.

Textbooks: 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.)

Topic	Weeks
Tuning Systems	3
Pitch; frequency; frequency ratios; octaves and other intervals; the twelve-tone scale; Pythagorean tuning; just intonation; equal temperament; alternate divisions of the octave	
The Group of Musical Variations	3
Transpositions; retrogrades; inversions; musical operations; modular arithmetic; groups and subgroups	
Change Ringing and Permutations	3
Change-ringing; permutations; the symmetric group	
Counting	4
The Multiplication Principle; permutations and combinations; counting melodies, chords, and rhythms; sequences and recursion; the Fibonacci (or Hemachandra) sequence and other recurrence relations	
Tests, Review & Other Activities	1
Additional Topics (as time permits)	
Patterns in music; time signatures; randomized music; music and geometry; electronic music	
Total	**14**

Evaluation

Homework	$10 - 15\%$
Tests	$30 - 40\%$
Project	$15 - 25\%$
Final Exam	$25 - 45\%$

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.

- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help

you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**

- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.