Math 101M
Mathematics for Music Majors

Instructor: Dr. Dominic Klyve
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Office Hours: Tuesday 11:00-1:00, Thurs 12:30-2:30, and by appointment

Course Goals: The goal of this course is to learn several pieces of basic mathematics which can help us to better understand music – its structure, arrangement, and perception. Several of the topics we shall cover are the same as those in a traditional math 101 class; others are completely different. The important consideration for us, however, is that each of them helps us to better understand music.

Prerequisites: Music 145 or equivalent. In particular, students must be able to read music, identify and understand intervals, scales, chords, and cadences.

Required Text: *Music and Mathematics: From Pythagoras to Fractals*, edited by Fauvel, Flood, and Wilson.

Additionally, other readings may be given out during the term.

Major Topics covered: A rough outline of what we will cover follows:

Week 1: **Warm-up and Problem Solving.**
In this week we shall learn to approach a variety of mathematical problems which will probably look different than the mathematics you learned in high school. The goal is to start to learn what it means to think like a mathematician, in anticipation of later parts of the course.

Weeks 2-3: **Scales and tuning systems**.
Why does the modern major scale have seven distinct tones? Why does the chromatic scale have twelve? We shall learn the mathematics behind the answers to these questions. Mathematical topics covered will include ratios, percents, percent change, and commensurability.

Weeks 4-5: Motivic Development.
Once a musical theme has been established, how can it be changed / modified / developed as the music progresses? Of course there are good musical answers to this question, and you will learn them in your music theory classes. However, there are also mathematical approaches to this question which can give new insight into this question. Mathematical topics covered will include symmetry, geometry, tilings, tessellations, and frieze patterns.

Weeks 6-8: Identifying the Perfect Sonata Form.
 After a brief review of the primary classical-era musical forms, we shall consider the question: what makes a perfect sonata? As usual, there are good musical answers, but in this class we shall approach this question via the language of statistics. We will learn some basic descriptive and inferential statistics, graphing, and modeling techniques, and then apply what we've learned to musical analysis.

Weeks 9-10: Students' Choice.
If things go according to plan, we will have time for one more topic, to be determined during the course by student vote.

Evaluation and Grading:
Grades will consist of five components: homework (10%), quizzes (40%), the scale project (15%), the statistics project (15%), and a final exam (20%).

Homework: Homework will be assigned sporadically at the end of class, and will typically be due the beginning of the next week. If you miss class for any reason, it is your responsibility to find out whether there was any homework assigned.

Quizzes: We will have about four quizzes during the term, to test your understanding and recall of some of the basic information we discuss.

The Scale Project: Working with a group, you will build and analyze your own musical scale. More information on this project will be given during the quarter.

The Statistics Project: This project, involving the statistical analysis of sonata forms, will take place late in the term. More information will be available when we begin the statistics section of class.

Final Exam: The final exam will be given Wednesday, June 6, at 8:00 a.m. You are required to be present for your final exam.

Attendance: Attendance is expected at each class. Students who arrive late and do not sign the attendance sheet will be counted as absent. The first five absences will not affect your grade. For every absence after that point, I will deduct 1% from your final grade. You can excuse up to five absences by submitting a two-page summary of the assigned reading for the day that you missed. Summaries are due within a week of the absence, without exception.

Disabilities: Students with disabilities who wish to set up academic adjustments in this class should give me a copy of their "Confirmation of Eligibility for Academic Adjustments" from the Center for Disability Services as soon as possible so we can discuss how the approved adjustments will be implemented in class. Students without this form should contact the Center for Disability Services, Bouillon 205 or dssrecept@cwu.edu or 963-2171.