

SYLLABUS – MATH299C: Mathematics & Classical Music

Course Description: The aim of this course is to explore the historical discoveries in mathematics that have influenced Western classical music, as well as musical expressions of specific mathematical concepts. This course is not meant to be a rigorous introduction to music theory or mathematics; rather, it is focused on introducing students to classical music through mathematical ideas that appear in it. Students will also have an opportunity to explore mathematics through music in the form of a creative project.

Course Details

- **Course:** MATH299C
- **Prerequisites:** None, although math through precalculus may be useful. Prior knowledge of basic music theory (ex. How to read music) will be helpful, but not necessary
- **Credits:** 1
- **Seats:** 15
- **Lecture Time:** Wednesday, 2-2:50
- **Location:**
- **Semester:** Fall 2019
- **Textbook:** None; any readings will assigned in class and made available on ELMS
- **Course Facilitators:** Siri Neerchal & Noah Whiteman
- **Faculty Advisor:** Dr. Niranjan Ramachandran

Topics Covered*

Syllabus may be subject to minor changes, but drastic revisions will require input of students/facilitators, and those involved will be notified immediately

- Basic math & music concepts
- Modes & cyclic permutations
- Horizontal structure of music
 - Rhythmic subdivisions
 - Pitch over time
- Defining music mathematically
 - Musical intervals & associated ratios
 - Pitches as frequencies
- Baroque Era
 - J.S. Bach
 - Equal temperament versus just intonation (and abelian groups)
 - Cabalistic code & musical cryptograms
- Classical Era
 - Leonhard Euler & musical consonance
 - Mozart's formula
- 20th Century Music
 - Fibonacci sequence
 - Béla Bartók
 - Claude Debussy
 - Atonality
 - Serialism

- Stochastic music
 - Transformations & symmetry
 - Paul Hindemith
- Miscellaneous topics
 - Beyond Western classical music
 - Statistics & musicology

*Subject to change at instructor/facilitator discretion.

Schedule

Week	Topic	Assignment
1 (8/28)	Syllabus	Assigned: Assignment #1
2 (9/4)	Basic Math & Music Concepts	Due: Assignment #1 Assigned: Assignment #2
3 (9/11)	Modality & Cyclic Permutations	Due: Assignment #2 Assigned: Assignment #3
4 (9/18)	Horizontal Structure	Due: Assignment #3 Assigned: Assignment #4
5 (9/25)	Intervals	Due: Assignment #4 Assigned: Assignment #5
6 (10/2)	Midterm Review	Due: Assignment #5 Assigned: None

7 (10/9)	MIDTERM	Due: None Assigned: Assignment #6
8 (10/16)	Baroque Era	Due: Assignment #6 Assigned: Assignment #7
9 (10/23)	Classical Era	Due: Assignment #7 Assigned: Assignment #8
10 (10/30)	Musical cryptograms Serialism Stochastic Music	Due: Assignment #8 Assigned: Assignment #9
11 (11/6)	Fibonacci sequence in music	Due: Assignment #9 Assigned: Assignment #10
12 (11/13)	Miscellaneous topics	Due: Assignment #10 Assigned: Final Project
13 (11/20)	Final Project Workshop	Due: Final Project Draft
14 (11/27)	THANKSGIVING (No class)	N/A
15 (12/4)	Final Project Presentations	Due: Final Project

Grading

This course will be graded out of 100 points, with a possible curve at the end of the semester. A score below 65 points will be a D or an F. A score of at least 65 points will be a C. A score of at least 75 points will be a B. A score of at least 90 points will be an A.

Your final course grade will be determined according to the following percentages:

Percentage	Title	Description
40%	Weekly HW	Weekly assignments based on lecture and reading material
25%	Class Participation	
15%	Midterm	In-class examination on material covered in lectures.
20%	Final Project	Creative musical project exploring a student-chosen mathematical topic.

Assignments/Late policy

- All assignments, with the exception of the midterm exam, will be submitted electronically on ELMS.
- Homework will be assigned after class each week and are due on ELMS at 11:59pm one week after it is assigned. Homework assignments are graded for completion, and there will be a small point deduction for late submissions.
- The midterm exam will be given in class. Students will be allowed to use their notes as well as a calculator on the exam.
- The final project will consist of a musical composition exploring a mathematical topic of the student's choice and an explanation of how the composition illustrates it. Students will have the opportunity to present their work to the class.

The last possible day that any assignment will be accepted and graded for credit will be *Monday, December 9* to allow for adequate grading time.

Communicating with course staff

Other means of communication have not been chosen as of now.

Interaction beyond the classroom is encouraged, but should be limited to important or more urgent issues. Topics that need not be addressed immediately can wait till class time.

Instructor Name and Email:

- Dr. Niranjan Ramachandran: atma@math.umd.edu

Facilitator Name and Email:

- Siri Neerchal: siri@terpmail.umd.edu
- Noah Whiteman: whiteman@terpmail.umd.edu

Excused Absence and Academic Accommodations

See the section titled "Attendance, Absences, or Missed Assignments" available at [Course Related Policies](#).

Disability Support Accommodations

See the section titled "Accessibility" available at [Course Related Policies](#).

Academic Integrity

Note that academic dishonesty includes not only cheating, fabrication, and plagiarism, but also includes helping other students commit acts of academic dishonesty by allowing them to obtain copies of your work. In short, all submitted work must be your own. Cases of academic dishonesty will be pursued to the fullest extent possible as stipulated by the [Office of Student Conduct](#).

It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

Course Evaluations

If you have a suggestion for improving this class, don't hesitate to tell the instructor or facilitators during the semester. At the end of the semester, please don't forget to provide your feedback using the campus-wide CourseEvalUM system. Your comments will help make this class better.