

## **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:**
- **Location:**
- **Semester:** Fall 2018
- **Textbook:** Readings assigned in class
- **Course Facilitator:** Siri Neerchal
- **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
- 20<sup>th</sup> Century Music
  - Fibonacci sequence
    - Béla Bartók
    - Claude Debussy
  - Atonality

- Serialism
  - Stochastic music
- Miscellaneous topics
  - Beyond Western classical music
  - Statistics & musicology

\*Subject to change at instructor/facilitator discretion.

### Schedule

Week	Topic	Assignment
1 (8/31)	Syllabus	Assigned: Assignment #1
2 (9/7)	Basic Math & Music Concepts	Due: Assignment #1 Assigned: Assignment #2
3 (9/14)	Modality & Cyclic Permutations	Due: Assignment #2 Assigned: Assignment #3
4 (9/21)	Horizontal Structure	Due: Assignment #3 Assigned: Assignment #4
5 (9/28)	Intervals	Due: Assignment #4 Assigned: Assignment #5
6 (10/5)	Midterm Review	Due: Assignment #5 Assigned: None
7 (10/12)	MIDTERM	Due: None Assigned: Assignment #6
8 (10/19)	Baroque Era	Due: Assignment #6 Assigned: Assignment #7

9 (10/26)	Classical Era	Due: Assignment #7  Assigned: Assignment #8
10 (11/2)	Musical cryptograms Serialism Stochastic Music	Due: Assignment #8  Assigned: Assignment #9
11 (11/9)	Fibonacci sequence in music	Due: Assignment #9  Assigned: Assignment #10
12 (11/16)	Miscellaneous topics	Due: Assignment #10  Assigned: Final Project
13 (11/23)	THANKSGIVING	N/A
14 (11/30)	Final Project Workshop	Due: Final Project Draft
15 (12/7)	FINAL	Due: Final Project

NOTE: Due dates are subject to change at instructor's discretion.

### 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.

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.
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### **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](mailto:atma@math.umd.edu)

Facilitator Name and Email:

- Siri Neerchal: [siri@terpmail.umd.edu](mailto:siri@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 TAs 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.