MAT 399 Syllabus

Semester:	Summer 2020
Course title:	Mathematical Music Theory
Instructor:	Professor Matt Klassen
Email:	mklassen@digipen.edu
Phone:	(425) 895-4423
Office hours:	W,F 3:00-4:30 or by appointment
Course Web Page:	http://azrael.digipen.edu/MAT399
Time/Place:	Friday 9:40-12:50, Online in Microsoft Teams

WEB PAGES AND MOODLE:

The Moodle page for MAT399 will contain a link to the course web page. The web page is the central repository for all course documents, including homework assignments. Updates to homework will be posted on the web page only. Scores for quizzes, homework, and projects, will be posted through perl scripts on the course web page.

The Moodle page will be primarily used for chat, forums, and for submission of projects.

MATERIALS:

Text: None. The course is based on lecture material, notes, and homework.

Reference Materials (not required) :

The Oxford Handbook of Neo-Riemannian Music Theories , E. Gollin and A. Rehding, eds.
Musical Actions of Dihedral Groups, Alissa S. Crans, Thomas M. Fiore, and Ramon Satyendra
Constraint-based systems of triads and seventh chords, and parsimonious voice-leading,
by Matt Klassen.

BACKGROUND MATHEMATICS:

Discrete Mathematics

BACKGROUND MUSIC THEORY:

Basic diatonic harmony, seventh chords

COURSE DESCRIPTION:

Mathematical Music Theory is a subject that goes as far back as the origins of mathematics and music in antiquity and has had a resurgence of study in modern times. This course will cover topics in transformational music theory, the Riemannian Tonnetz, triadic progressions and voice-leading, graphs of triads and seventh chords, introductory group theory, groups of transformations on chord systems, cycles on chord graphs, harmonic progressions, and random walks on chord graphs. Applications to algorithmic music will be discussed and illustrated through project work.

COURSE GOALS AND OBJECTIVES:

1) Students will learn basic structures in mathematical music theory: including chord progressions and their geometric representations in the Tonnetz and graphs. They will demonstrate their understanding through a programming project and also through various homework and quizzes.

2) Students will solidify their knowledge of Discrete Mathematics by using it as a tool to solve problems involving paths on graphs of chords.

QUIZZES AND EXAMS:

Quizzes will be given periodically to test comprehension of lecture material. There are no make up quizzes, but I do drop your lowest two quiz scores. The quizzes will last for approximately twenty minutes.

For multiplie choice quizzes and exams, please follow these procedures: Work out the quiz problems and circle your answers on the question sheet. When you are finished, transfer the answers to the answer sheet. Go to a web browser and enter the answers online. Under no circumstances are you allowed to discuss the quiz questions with any other student during the quiz or the data entry process. You should turn in the answer sheet at the front of the room, and keep the question sheet for reference. Your scores will be posted online by your student ID.

There will be no exams in this course.

GRADING:

Homework	25%
Quiz	25%
Projects	50%

Grades will be determined based on total course percentage. Percentage scores will determine letter grades according to the scale: (in the worst case)

A	$93 - 100$	A-	$90 - 92.9$		
B+	$87 - 89.9$	B	$83 - 86.9$	B-	$80 - 82.9$
C+	$77 - 79.9$	C	$73 - 76.9$	C-	$70 - 72.9$
D	$60 - 69.9$	F	< 60		

ACADEMIC INTEGRITY:

Academic dishonesty, or cheating, occurs when a student represents someone else's work as their own, or assists another student in doing so. This can happen on exams, quizzes, homework, or projects. Academic dishonesty also may occur when a student uses any prohibited reference or equipment in the completion of a task. For example, the use of a calculator, notes, books or the internet when it is prohibited. Plagiarism is a common form of academic dishonesty. This can take the form of copying and pasting exerpts from the web, and representing them as original work. The type and severity of any occurence, as well as the legitimacy of any claim of academic dishonesty, will be judged by the instructor and the disciplinary committee. All students are asked to help in promoting a culture of academic integrity by discouraging cheating in all forms.

HOMEWORK ASSIGNMENTS:

Homework will be assigned and posted on the web page and collected weekly. You are responsible for checking the web page and noting the assignments and the due date. You may work on homework together, as well as consult the tutors and the instructor. However, the final work that you turn in must be your own work.

PROJECTS:

The full description of the programming project can be found on the course web page. Submission of projects should be in a zipped folder which contains source and executable and which can be uploaded on the Moodle page.

COMPUTATIONAL RESOURCES:

You are encouraged to do algorithmic music using paths on graphs of chords as part of the project work. Suitable software for this purpose can include Juce, AVAudioEngine, Pure Data, and various DAWS.

DISABLED STUDENT SERVICES:

Students with physical, psychological or learning disabilities that affect their ability to perform major life activities associated with this class may be eligible for reasonable accommodations under the Americans with Disabilities Act. If you have a documented disability please contact the Disability Support Services office to arrange for accommodations for this class.

TENTATIVE WEEKLY TOPICS:

Week	Dates	Topics
1	May 4 - 2	Review of major and minor chords
2	May 11 - 15	Voice-leading, L,R,and S transforms
3	May 18 - 22	Seventh chords, types, inversions and voice-leading
4	May 26 - 29	Groups, transformations and group actions
5	June 1 - 5	Dihedral group and the Tonnetz
6	June 8 - 12	Transformation group for triads, with diminished and augmented
7	June 15 - 19	Classic triadic progressions and examples
8	June 22 - 26	Transformation group for seventh chords
9	June 29 - July 2	Extended groups for larger systems
10	July 6 - 10	General constraint-based systems
11	July 13 - 17	Algorithmic progressions, and cycles in chord graphs
12	July 13 - 17	Hamilton paths and cycles
13	July 20 - 24	Final Exams