12-Week Curriculum: Sentiment-to-Sound AI Music Project

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0. Course Introduction

This 12-week project-based course introduces high school students to the intersection of music and artificial intelligence. Students will design and implement a tool that selects music from a database based on emotional input (e.g., ”happy,” ”sad,” ”angry”). If time permits, students will **explore** how to use AI to generate new music. The course integrates concepts from music theory, Python programming, human-centered design, and machine learning; making it ideal for students interested in both the arts and technology. Note: This curriculum is flexible and is subject to updates as we see fit.

1. Words About this Course

This course isn’t designed to be an AP, or college equivalent. Think of it as if we are a soccer team, you are my two players and I’m the coach. I can’t kick the ball and score for you, it's up to you and your dedication. There is no concrete plan (yet) as you have to know where you are going to make a plan. And once you figure out your bearings you will **explore** your own decisions and plans, which I will guide you through.

This summer there will be no tests, no quizzes, and no final grade. What I care about is your ability to think critically in programming, music, and AI. My assessment of you comes in the form of projects and assignments.

2. Student Expectations

- Complete weekly assignments and mini-projects aligned with each topic.
- Engage actively in weekly meetings/check-ins
- Maintain a coding notebooks (e.g. google colab) from your python learnings
- Contribute regularly to the version-controlled GitHub repository (later part of the summer).
- Demonstrate initiative in **exploring** tools and methods beyond the minimum requirements

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3. Weekly Topics and Learning Outcomes (Subject to Change)

Week 1: Introduction to AI and Programming

- Topics:
  - Class Introductions
  - Demo Gen AI and Genre Classification
  - AI/ML/DL/GAI
  - Start with Google Colab
- Learning Outcomes: Course Overview, programming starts, **explore** AI

Week 2: Programming and Audio

- Topics:
  - Assignment 1 Checkup
  - Tabular Data
  - Analog vs. Digital
  - Feature Extraction

    - Some math (but the fun kind 💀)
    - Python
    - Assignment 2 Starts
- Learning Outcomes: growing understanding of how computers represent audio and music, continued python programming

Week 3-12: To Be Determined (TBD)

- Potential Topics for the future
    - Intermediate python
        - Modular code
        - Docstrings
        - pip
    - Advanced python
        - Class based, decorators, APIs
    - Git/GitHub
        - Best practices
        - New Feature workflow
        - PRs
    - OOP
    - Data science
        - Scikit-learn, pandas, numpy, matplotlib, seaborn
    - Music Theory
        - Western vs. Eastern
    - Digital Music Composition
        - MIDI files and workflows
    - Audio Feature Extraction
    - PyTorch
    - Mathematical Background of AI
        - linear algebra, multi-dimensionality, entropy, etc.