

AI through Game Development Pathway for Vihaan

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1 Personalized Learning Approach

This course is designed specifically for Vihaan, building on his experimentation with game development to explore artificial intelligence. Recognizing his preference for hands-on learning over virtual instruction, we'll:

- Build on existing game development knowledge.
- Use project-based learning with immediate visual feedback.
- Have no theoretical lectures. Everything will be hands on and he will be able to immediately see what he's building so that he remains interested.
- Develop troubleshooting skills through guided problem-solving.

2 Course Structure & Methodology

Learning Pathway

Weekly Sessions:

- 60 minute hands-on coding sessions
- Flexible scheduling, at least once a week **recommended**
- Focused on an optimal balance between the student's questions and the direction of this syllabus

Homework Philosophy:

- Purpose-driven mini-projects (not exercises)
- Designed to reinforce concepts over short challenges on throughout the week
- Optional extension challenges for deeper exploration
- **15-minute complementary** midweek homework review session

Mathematical/Theoretical Foundation:

- Contextual introduction to vectors/matrices through game physics
- Exponents/logarithms in probability systems
- Just-in-time learning of required concepts. No boring lectures!

3 Initial Skills Assessment

On the first session, Vihaan will create a simple game prototype to demonstrate his current approach to problem-solving and technical implementation:

Game Choice	Learning Focus Areas
Ping-Pong	Physics, collision detection, input handling
Space Invaders	State management, AI patterns, scoring
Dinosaur Runner	Procedural generation, timing systems
Student's Choice	Self-directed design, scope management

Evaluation Criteria

We'll focus on Vihaan's:

- **Problem-solving workflow:** How he approaches challenges
- **Resource utilization:** Documentation/Google/LLM usage
- **Debugging methodology:** Response to errors like `AttributeError`
- **Creative implementation:** Unique solutions to game mechanics

Neither does the game nor the exact mechanics matter that much. His methodology while building this simple game will be enough to determine where he stands and what sections are more or less relevant to him.

4 Python Foundations

- **Covered in:** First half of Core Syllabus (Variables, Control Flow, Functions, etc.)
- **AI Connection:** Basic decision-making as primitive AI
- **Project:** Text-based adventure with simple NPC responses
- **Pace:** Student determines speed based on prior knowledge

5 Game Mechanics & Basic AI

- Pygame basics: Sprites, collision, animation
- **AI Integration:** State machines for enemy behavior
- **Project:** Maze runner with pathfinding enemies
- **When ready:** Student moves on after completing core game loop

6 Data Handling & Prompt Engineering

- **AI Integration Point 1:** Gemini API
 - Dynamic dialogue generation for NPCs
 - Prompt engineering fundamentals
 - Basic response evaluation
- **Project:** RPG with AI-generated quests
- **Trigger:** When game needs complex interactions

7 Vector Databases & Memory Systems

- **AI Integration Point 2:** Vector databases
 - Implementing NPC memory systems
 - Semantic search for game content
 - Knowledge retrieval applications
- **Project:** Detective game with AI assistant
- **Trigger:** When game needs persistent knowledge

8 Neural Networks & Learning Agents

- **AI Integration Point 3:** PyTorch fundamentals
 - Neural networks for behavior prediction
 - Reinforcement learning concepts
 - Adaptive difficulty systems
- **Project:** Strategy game with learning opponents
- **Trigger:** After implementing basic game AI

9 Advanced AI Systems

- **AI Integration Point 4:** Fine-tuning & RLAIIF
 - Customizing AI for specific game genres
 - Reward modeling and evaluation
 - Procedural content generation
- **Capstone:** Student-designed AI game
- **Trigger:** For final project development

10 AI Integration Framework

Learning Pathway

Self-Paced Progression:

- Student controls learning speed and project choices
- AI concepts introduced when relevant to current project
- Milestone-based rather than time-based advancement

Foundation Reference:

- Python basics covered in Core Syllabus (First Half)
- Student reviews relevant sections as needed
- Focus sessions on gaps identified during projects

AI Implementation Pathway:

AI Concept	Integration Point	Game Application
Gemini API	First complex NPC interactions	Dynamic dialogue, quest generation
Prompt Engineering	When responses need refinement	Character personality consistency
Vector Databases	Persistent knowledge required	NPC memory, player behavior recall
PyTorch Models	Basic AI implemented	Adaptive enemies, behavior prediction
Fine-Tuning	Specialized game needs	Genre-specific AI customization

11 Improvement

If this curriculum deviates too much from your expectations or is insufficient in any other way, let me know and changes will be made.