

Course Proposal: CMSC 425–Game Programming

Catalog Description:

CMSC 425, Game Programming (3) Corequisite: CMSC 427.

An introduction to the principles and practice of computer game programming and design. This includes an introduction to game hardware and systems, the principles of game design, object and terrain modeling, game physics, artificial intelligence for games, networking for games, rendering and animation, and aural rendering. Course topics are reinforced through the design and implementation of a working computer game.

Sample Syllabus:

Introduction: History and evolution of games, applications in entertainment, education, and training.

Game Hardware: GPUs and PPU, game consoles, mobile gaming, peripheral devices and displays.

Real-time Graphics: Review/survey of GLUT, OpenGL, event-driven programming, transformations, illumination, texturing, efficiency issues, programmable GPUs and shaders.

Game Design: Game architecture, scene graphs and game engines.

Object Modeling: Shape representations and triangle meshes, level of detail, terrain modeling, articulated models, skinning and blending, procedural and texture modeling, geometry synthesis.

Game Physics: Newtonian dynamics, particle simulation, mass-spring models, collision detection and response, physics on GPUs.

Game AI: Agent- and rule-based systems, finite-state machines, path planning, flocking and steering.

Animation: Physics-based animation, AI-based animation, motion capture, articulated characters, stylized animation, scripting.

Lighting and Aural Rendering: Spherical harmonic lighting, 2D and 3D audio and HRTFs, audio acquisition and libraries, local and global aural rendering.

Networking and Multiplayer Games: Sockets programming, multiplayer games, online games, distributed virtual worlds, latency hiding, distributed data consistency.

Game Design Issues: Storytelling structure, fidelity and the uncanny valley, geometry and motion capture.