COURSE DESCRIPTION

Department and Course Number	CIS 488	Course Coordinator	Bruce R. Maxim
Course Title	Computer Game Design and Implementation II	Total Credits	3

Current Catalog Description

This course is a continuation of the material studied in CIS 487. The focus of the course will be hands-on development of computer games and computer game development tools (e.g. game engines). Students will study a variety of software technologies relevant to computer game design, including: 3D graphics, computer animation, data-driven game design, multiplayer game programming, and game AI. Lecture topics will be taken from several areas of computer science: simulation and modeling, computer graphics, artificial intelligence, game theory, software engineering, human computer interaction, and game content development.

Textbook

LaMothe, A. *Tricks of the 3D Game Programming Gurus*
Chapandard, A. *AI Game Development*

References

Dalmau, D. *Core Techniques and Algorithms in Game Programming*

Course Goals

This course presents a variety of technologies relevant to the design and production of multi-media computer games including: computer animation, artificial intelligence, human computer interaction, software engineering game theory, and multi-media software design.

Prerequisites by Topic

1. Students are assumed to have taken discrete mathematics prior to this course.
2. Knowledge of data structures and abstract data types.
3. Ability to apply knowledge of algorithm analysis.
4. Knowledge of rapid prototyping and component-based development methodologies assumed.
5. Previous experience with object-oriented programming assumed.
6. Previous experience with windows programming assumed.
7. Ability to write and document large programs.
8. Ability to apply the principles of computer-human interaction and user interface design.
9. Some knowledge of software production management techniques assumed.

Major Topics Covered in the Course

1. Windows and DirectX Programming (3 hours)
2. Designing Math Engines (3 hours)
3. 3D Graphics (2 hours)
4. Solid Modeling (2 hours)
5. Texture Mapping (2 hours)
6. 3D Clipping and Depth Buffering (2 hours)
7. 3D Rending (2 hours)
8. Shadows and Lighting (2 hours)
9. Animation and Collision Detection (3 hours)
10. Artificial Intelligence Engineering in Game Design (3 hours)
11. Navigation and Obstacle Avoidance (2 hours)
12. Tactics and Weapon Selection (2 hours)
13. Fuzzy Logic and Learning (4 hours)
14. Emotions and Finite State Machines (2 hours)
15. Decision Making and Reactive Learning (2 hours)
16. Project Presentation and Evaluation Activities (8 hours)

Laboratory projects (specify number of weeks on each)

1. Review and critique an existing commercially written computer game (1 week).
2. Evaluate and critique game AI written by classmates (1 week).
3. Evaluate and critique multi-media games written by classmates. (1 week)
4. Design and implement an intelligent opponent for an original computer game. (6 weeks)
5. Design and implement a 3D multi-media computer game, create design documents for the game, and implement the game using Visual C++ and DirectX. (6 weeks)

Estimate CSAB Category Content

	CORE	ADVANCED		CORE	ADVANCED
Data Structures		0.5	Computer Organization and Architecture		
Algorithms		2.0	Concepts of Programming		0.5
Software Design			Languages		

Oral and Written Communications

Every student is required to submit at least 4 written reports (not including exams, tests, quizzes, or commented programs) of typically 10 pages and to make 4 oral presentations of typically 10 minutes duration.

Social and Ethical Issues

None.

Theoretical Content

None.

Problem Analysis

1. Develop the requirements for an intelligent computer opponent for a computer game. (2 weeks)
2. Develop the requirements for a 3D multi-media computer game. (2 weeks)

Solution Design

1. Design an original game using an intelligent opponent of the student's own design. (6 weeks)
2. Design a 3D multi-media computer game, create design documents for the game, and implement the game using Visual C++ and DirectX. (6 weeks)