

**UNIVERSITY OF NEBRASKA AT OMAHA
COURSE SYLLABUS**

Department and Course Number	CSCI 3510
Course Title	Advanced Game Programming
Course Coordinator	Patrick Cavanaugh
Total Credits	3
Repeat for Credit?	No
Date of Last Revision	February 22, 2014

1.0 Course Description Information

1.1 Catalog description:

This course takes a further look into the concepts of game programming including 3D programming by learning and using the XNA environment.

1.2 Prerequisites of the course:

CSCI 2510 CSCI 3320

1.3 Overview of content and purpose of the course:

This course takes the basics of Game Programming from Intro to Game Program and expands them into an object oriented and 3D environment. The XNA framework is used to discuss and demonstrate common concepts of 3D game programming found in all environments. The class will focus on rendering and manipulating objects in a 3D space as well as the interaction between those objects.

1.4 Unusual circumstances of the course.

None

2.0 Course Justification Information

2.1 Anticipated audience / demand:

This course is designed for junior/senior Computer Science students with an interest in Video Game Programming.

2.2 Indicate how often this course will be offered and the anticipated enrollment:

This course is offered every other semester with an anticipated enrollment of 20 students.

2.3 If it is a significant change to an existing course, please explain why it is needed:

N/A

3.0 List of performance objectives stated in learning outcomes in a student's perspective:

- 3.1 Use of Visual Studio and the C# programming language
- 3.2 Creating and inclusion of basic game assets
- 3.3 Sprite manipulation
- 3.4 Music and sound effects
- 3.5 Representing a 3D world
- 3.6 Interaction of objects within the world and with other objects

- 3.7 Creating first and third person cameras
- 3.8 Basics of game networking

4.0 Content and Organization Information

- 4.1 List the major topics central to this course:
 - 4.1.1 XNA Introduction (1 weeks)
 - 4.1.1.1 Learning the Environment
 - 4.1.1.2 Basic Game Structure
 - 4.1.2 2D Graphics in XNA (2 weeks)
 - 4.1.2.1 Rendering Sprites
 - 4.1.2.2 Sprite Movement and Animation
 - 4.1.3 Input (1 week)
 - 4.1.3.1 Detecting and Handling Input
 - 4.1.3.2 Collision Detection
 - 4.1.4 Sound Effects and Audio (1 week)
 - 4.1.4.1 Creating Audio with XACT
 - 4.1.4.2 Implementing Music and Sound Effects
 - 4.1.5 3D Game Programming Basics (2 weeks)
 - 4.1.5.1 3D Coordinate Systems
 - 4.1.5.2 Vertices and Primitives
 - 4.1.5.3 Vectors and Transformations
 - 4.1.5.4 Models and Meshes
 - 4.1.6 Rendering Pipeline, Shaders and Effects (2 weeks)
 - 4.1.6.1 XNA Rendering Pipeline
 - 4.1.6.2 Shaders
 - 4.1.6.2.1 Creating a Shader
 - 4.1.6.3 Effects
 - 4.1.7 Camera and Lighting (1 week)
 - 4.1.7.1 Using and Enhancing the BaseCamera class
 - 4.1.7.2 Creating a First Person Camera
 - 4.1.7.3 Generating and managing lighting effects
 - 4.1.8 3D Collision Detection (1 week)
 - 4.1.8.1 Creating a moving enemy
 - 4.1.8.2 Bounding Spheres
 - 4.1.9 Game Networking (1 week)
 - 4.1.9.1 Topologies
 - 4.1.9.2 XNA Networking
 - 4.1.9.2.1 Creating Sessions
 - 4.1.9.2.2 Singing in a gamer
 - 4.1.9.2.3 Handling Messages
 - 4.1.10 Creating a full 3D game (3 weeks)
 - 4.1.10.1 Integrating all ideas into a final project

5.0 Teaching Methodology Information

5.1 Methods:

The material is taught through lectures based on slides as well as in class examples and participation.

5.2 Student role:

Students are expected to have an active role in class, asking questions as well as participating in demonstrative examples. Students will also be responsible for completing projects to demonstrate what they have learned.

6.0 Evaluation Information

6.1 Describe the typical types of student projects that will be the basis for evaluating student performance:

After major topics are discussed there will be a project focused on that topic. Previous topics may also be required in implementation. Typical projects are give one to two weeks to complete.

6.2 Describe the typical basis for determining the final grade (e.g. weighting of various student projects):

Normal projects will be worth 10% - 15% of the final grade, the final project being worth approximately 20%.

6.3 Grading type:

A+	97% - 100%	4.00 GPA
A	93% - 96%	4.00 GPA
A-	90% - 92%	3.67 GPA
B+	87% - 89%	3.33 GPA
B	83% - 86%	3.00 GPA
B-	80% - 82%	2.67 GPA
C+	77% - 79%	2.33 GPA
C	73% - 76%	2.00 GPA
C-	70% - 72%	1.67 GPA
D+	67% - 69%	1.33 GPA
D	63% - 66%	1.00 GPA
D-	60% - 62%	0.67 GPA
F	0% - 59%	0.00 GPA

7.0 Resource Material Information

7.1 Textbooks and/or other required readings used in course:

7.1.1 Reed, Arron. *Learning XNA 4.0*. O'Reilly.

7.1.2 Alexandre Lobao, Bruno Evangelista, Hose Antonio Leal de Farias. *Beginning XNA 3.0 Game Programming*. Apress Publishing

7.1.3 Riemer Grootjans. *XNA 3.0 Game Programming Recipes*. Apress Publishing

7.2 Other student suggested reading materials:

- 7.2.1 Stephen Cawood, Pat McGee. *Microsoft XNA Game Studio Creator's Guide*. McGraw-Hill
- 7.2.2 Donis Marshall. *Programming Microsoft Visual C#: The Language*. Microsoft Press

7.3 Current bibliography and other resources:

- 7.3.1 Reed, Arron. *Learning XNA 4.0*. O'Reilly.
- 7.3.2 Alexandre Lobao, Bruno Evangelista, Hose Antonio Leal de Farias. *Beginning XNA 3.0 Game Programming*. Apress Publishing
- 7.3.3 Riemer Grootjans. *XNA 3.0 Game Programming Recipes*. Apress Publishing
- 7.3.4 Stephen Cawood, Pat McGee. *Microsoft XNA Game Studio Creator's Guide*. McGraw-Hill
- 7.3.5 Donis Marshall. *Programming Microsoft Visual C#: The Language*. Microsoft Press
- 7.3.6 Miller, Johnson. *XNA Game Studio 4.0 Programming*. Addison-Wesley Professional
- 7.3.7 Jaegers, Kurt. *XNA 4.0 Game Development by Example*. Packt Publishing
- 7.3.8 Randolph, Gardner, Anderson, Minutillo. *Professional Visual Studio 2010*. Wrox Publishing
- 7.3.9 Dille, Platten. *The Ultimate Guide to Video Game Writing and Design*. Lone Eagle.
- 7.3.10 Thompson, Berbank-Green, Cusworth. *Game Design: Principles, Practice, and Techniques*. Hoboken, NJ: Wiley.

8.0 Other Information:

- 8.1 Accommodations statement:
- 8.2 Other:
- 8.3 Author(s):
Patrick Cavanaugh

9.0 Computer Science Accreditation Board (CSAB) Category Content (class time in hours):

<i>CSAB Category</i>	<i>Core</i>	<i>Advanced</i>
Data structures	2	2
Computer organization and architecture	1	1.5
Algorithms and software design	10	15
Concepts of programming languages	5	3.5

10.0 Oral and Written Communications:

Every student is required to submit at least 1 written reports (not including exams, tests, quizzes, or commented programs) to typically 2 pages and to make 1 oral presentations of typically 15

minutes duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

11.0 Social and Ethical Issues:

When discussing game creation, acceptable content will be discussed.

12.0 Theoretical content:

Please list the types of theoretical material covered, and estimate the time devoted to such coverage.

- XNA and C# environment
- Basic 2D graphics
- Game input
- Sound effects and audio
- 3D Game Programming Basics
- Shaders
- Cameras and Lighting
- Collision Detection
- Game Networking
- Final Project

13.0 Problem analysis:

Please describe the analysis experiences common to all course sections.

Any kind of coding requires problem analysis. What tools to use to best solve a problem and how to make it efficient are discussed.

14.0 Solution design:

Please describe the design experiences common to all course sections.

Besides the given assignments with well defined tasks, students will also be required to design and create their own game, on their or own or within a group environment.

CHANGE HISTORY

<i>Date</i>	<i>Change</i>	<i>By whom</i>	<i>Comments</i>
5/2009	Initial Creation for Special Topics	Cavanaugh	
4/6/2010	Updated for course number, added change history and outcomes vs objectives table	Cavanaugh	
5/10/2011	Revised for new format	Cavanaugh	
02/22/2014	Syllabus Reviewed, no changes	Cavanaugh	
02/22/2014	Syllabus Reviewed, no changes	Cavanaugh	

