

**Course title:** 3D Game Programming with XNA

**Instructor:** Radu Paul Mihail, 312 Davis Marksbury Building, Email: r.p.mihail@gmail.com

**Class meeting times and location:** MWF 3:00 pm-3:50 pm in Ralph G Anderson (RGAN) Room 202

**Office Hours:** TBD .

**Textbook:** Learning XNA 4.0: Game Development for the PC, Xbox 360, and Windows Phone 7  
Author: Aaron Reed  
ISBN-10: 1449394620 — ISBN-13: 978-1449394622

**Prerequisites:** A minimum grade of B in CS 215 or approval from the instructor.

**Course Description:** The video game industry has changed drastically over the last two decades. 20 years ago, an individual with average programming skills could easily develop a game almost up to par with industry standards. This was possible due to limited hardware capabilities of that time. The explosion in complexity of hardware and techniques available to game developers has made it impossible for shrewd programmers to achieve impressive results without years of formal training. In this course, we will explore game development techniques, from a 2D game like “Snake” to a third person 3D shooter. While it is unrealistic to gain expertise in game development over the course of a semester, this course will provide the students with knowledge of the basics such as sprites, billboarding and projective geometry. We will also cover some advanced topics such as HLSL (High Level Shading Language) and linear skinning.

**Learning Outcomes:** Students will understand basic game programming terminology and techniques. More specifically students will:

1. Understand 2D graphics used in early games
2. Understand 3D graphics and the graphics pipeline used in modern games
3. Understand keyframe and skeletal animation techniques
4. Be able to use XNA and implement both 2D and 3D games for the PC and Xbox 360

**Tentative Course Outline:**

- Week 1:
  - Introduction to XNA Game Studio - Chapter 2
  - Structure of a game - Chapter 3
  - 2D and screen coordinate systems - Chapter 3

- Week 2:
  - Sprites - Chapter 3
  - User input: keyboard and mouse in XNA - Chapter 4
  - Audio content in XNA - Chapter 6
- Week 3:
  - First homework assignment, your first 2D game: Snake
  - Game states and scoring - Chapter 8
  - Matrix algebra review (vector addition/multiplication, matrix operations)
  - Basic Artificial Intelligence - Chapter 7
- Week 4:
  - 3D game programming basics - Chapter 9
  - Vectors, matrices, transformations, quaternions in XNA
  - 3D Models, vertices, primitives - Chapter 10
- Week 5:
  - Second homework assignment: billboarding
  - First person cameras - Chapter 11
  - 3D collision detection and shooting - Chapter 12
- Week 6:
  - XNA rendering pipeline
  - Textures, rasterization
  - Third homework assignment: maze game
- Week 7:
  - HLSL - Chapter 13
  - Shaders - Chapter 13
  - Techniques, passes and effects in XNA - Chapter 13
- Week 8:
  - Advanced lighting
  - Fourth homework assignment: environment mapping using HLSL
- Week 9:
  - Projection and shadowing effects
- Week 10:
  - Height map, terrains
  - Fifth homework assignment: implementing plasma fractal terrain
- Week 11:
  - Keyframe animation
  - Skeletal animation
- Week 12:
  - Serious games - reading assignments and discussion
- Week 13:
  - Game presentations
- Week 14:
  - Final project presentations
- Week 15:
  - Final projects due

**Assessment:**

The grade for this course will be calculated as follows:

- Online discussions worth 10% of the course grade
- 5 homework projects worth 35% of the course grade
- Quizzes throughout the semester worth 10% of the course grade
- Midterm examination worth 15%
- Game presentation worth 5%
- Group final project worth 25%

Grades will be assigned according to the following scale:

90-100%	= A
80-89%	= B
70-79%	= C
60-69%	= D
Below 60%	= E

*Quizzes:* There will be pop quizzes that will test recently covered material.

*Online discussion:* Each week students are expected to create at least one new discussion thread with a subject related to the material covered during that week. The thread can be a question with supporting evidence that you read the material, an insight (aha! moment in words), a brief summary of a topic not covered in class, or anything else relevant to the material covered until that point. The other requirement is for each student to reply to at least two threads. The original post has to have at least 2 paragraphs while the responses can be 1 paragraph.

*Programming assignments:* There will be 5 **individual** programming assignments. Each student will submit their source code and sample outputs (screen shots) along with a write-up.

*Game presentation:* Each student has to make a short (5 minute) presentation of their favorite game. The presentation will cover technical aspects of the game that were new and interesting when they were released (Wolf3D, Doom or Quake I are examples).

*Final project:* In addition to the programming assignments, there will be a final project. Students will work with their group on their final project. The final project consists of creating a 3D XNA game using the topics learned in class. You are required to submit a write-up consisting of the following:

- Brief overview of the game (1 page max)
- Technical challenges you addressed
- Game mechanics
- Scoring logic used

- Team report: who did what

*Late assignment policy:* Students are entitled to 3 “free days” for the whole course. The first 24 hours after the due date and time counts as 1 day, up to 48 hours is two and 72 for the third late day. Once the free days are used, each additional day costs 20% of the assignment.

**Academic Honesty:** Standard – use common sense. I am aware Google is an invaluable tool for information search, therefore it is expected you CITE any ideas, code or text you find online. Failure to do so will result in a grade of 0 on the assignment for the first offense and failure of the course for the second. All homework assignments will have a write-up where you can include citations. The official policy on plagiarism can be found here: <http://www.uky.edu/Ombud/Plagiarism.pdf>

**Extra Help:** Do not hesitate to come to my office during office hours or by appointment to discuss a homework problem or any aspect of the course. Email is the best way to get ahold of me.

**University Attendance Policy:** Standard for CS. Please note that attendance is key to good grades in virtually all classes, including this one. Chronic tardiness and multiple absences will lead to a poor grade - that’s a promise.

**Accommodation:** If you have a documented disability that requires academic accommodations, please contact me as soon as possible. In order to receive accommodations in this course, you must provide a Letter of Accommodation from the Disability Resource Center. If you have not already done so, please register with the Disability Resource Center for coordination of campus services available to students with disabilities (Room 2, Alumni Gym, 257-2754, Jake Karnes, [jkarnes@email.uky.edu](mailto:jkarnes@email.uky.edu))

Accommodations can be made for all parts of the course. These letters are NOT retroactive! This means that we only make special arrangements for class activities after we receive the letter.