

# COMP 3501: Foundations of Game Programming and Computer Graphics

## Contact

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Lectures MW 10:00-11:30, TB 447

## Textbooks and Resources

The textbook for the course will be *Microsoft XNA Game Studio Creator's Guide*, **Stephen Cawood and Pat McGee**, 2nd edition (the blue one, not the green one). We will be referring to the text for specific topics during the term, and also covering topics not in the book.

We will be relying heavily on Microsoft's XNA 3.1. Before the second class, you should download the software and try one of the starter kits. You may also find various online tutorials and code fragments useful. You are free to make use of such material provided you credit the source. In particular, models and images found online are fair game. I particularly recommend TurboSquid as a potential source of free models to incorporate into your assignments and project.

## Topics

The course's main topics include the following:

- Mathematical foundations: coordinate systems, vectors, vector operations, matrices, quaternions
- Real-time rendering: the Z-buffer, pixel and vertex shaders
- Texture: texture mapping and texture synthesis
- Camera: translation, rotation, perspective, and camera control
- Illumination: the 3-term lighting model and alternatives
- Physical simulation: numerical integration, kinematics, dynamics, particle systems, rigid-body motion

Additional topics, such as procedural modeling, raytracing, and multipass shader effects, will be undertaken as time permits.

## **Grading Scheme**

Assignments (approximately weekly): 25%

Midterm: 15%

Course project: 20%

Final exam: 40%

## **Course Project**

One of the main components of the course is a large project, to be undertaken in a group of 2 or 3 and to be presented in class. Your final submission will include your implementation, adequately documented, and a written report, not to exceed 10 pages. You should also plan to include an appendix of supplemental material, which can include technical details, additional screenshots, concept art, and anything else you think would be helpful to understanding your project.

There are only three requirements for the project: that the result be an interactive computer program, that the program is written using XNA 3.1, and that it include 3D graphics in some way. Beyond that, you are free to decide on your own what to do and what resources to draw on.

Proposed projects must be approved by the instructor. Early in the term, you will submit a 1-2 page proposal describing your idea. Try to be realistic in the scope of your project. Typical projects fall in one of three categories: a game with 2D gameplay rendered in 3D (e.g., many RTS games); a portion of a 3D game (such as a FPS); or a piece of technology for use in a 3D game (e.g., a fluid simulator, a novel rendering technique, or a character animation system).