Purpose

The purpose of this course is to familiarize students with issues and techniques of computer games design in general, and more specifically game engine design. With the proliferation of computer games, a number of distinct genres have emerged. Each genre of computer game provides a unique set of design challenges for designers. While there are no “one size fits all” solutions to game design problems, there are a number of techniques common to many different games. These commonalities have given rise to game engines which are software tools to aid designers. Behind almost all successful commercial games are a game engine.

In this course we will examine some of the components of a commercial strength game engine. We will survey different genres of games, using some of the unique design challenges each genre provides as a motivation for an in-depth examination of the affordances games engines provide for designing games of that genre. We will cover topics ranging from data structures, resource management, game loops and logical timing systems, scripting, error logging, and networking.

Students will be given a sequence of four multi-week homework assignments, or mini-projects, related to the lecture material. These assignments will require students to implement and/or evaluate some of the algorithms or techniques we are covering during course lectures. Each assignment will build upon previous assignments, and by the end of the course students will have implemented a limited functionality game engine of their own. All students will additionally be evaluated with a midterm and a final exam.

Instructor

David L. Roberts
robertsd@csc.ncsu.edu
919-513-7182
Office hours: T/W 2:00-3:00, EB2 2254. You are welcome to stop by my office at other times, but I reserve the right not to meet with you even if I’m there.

Teaching Assistants

Shengyen Chen (stchen@ncsu.edu)
Andrew Hansen (adhansen@ncsu.edu)
Office hours: TBD, check the course webpage.

Student Learning Outcomes

By the end of the semester, students should be able to accomplish the following:
• Understand the role of a game engine in the game design process.
• Identify relevant game engine technologies that enable the design of various genres of computer games.
• Implement a simple game engine with sufficient capabilities to support the design of a sample game.

Text
Although not required, this course will cover selected topics presented in:

• *Game Engine Design and Implementation*, by Alan Thorn, 2010.
• *Massively Multiplayer Game Development (Charles River Media Game Development)*, by Thor Alexander, 2003.
• *Massively Multiplayer Game Development 2 (Charles River Media Game Development) (v. 2)*, by Thor Alexander, 2005.

Prerequisites
• CSC316, and junior or senior undergraduate standing as a CSC concentrator.

Policies and Procedures

Academic Integrity
Students are required to follow NCSU policy. “Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student’s record or academic career” (NCSU Code of Student Conduct). It is the instructor’s understanding and expectation that the student’s submission of any assignment means that the student contributed to the assignment in question (if a group assignment) and that they neither gave nor received unauthorized aid (if an individual assignment). Authorized aid on an individual assignment includes discussing the interpretation of the problem statement, sharing ideas or approaches for solving the problem, and explaining concepts involved in the problem. Any other aid would be unauthorized and a violation of the academic integrity policy. This includes referring to homework from previous semesters. Any computer work submitted must be completed on your own personal computer or from your own NCSU account to avoid confusion about the origin of the files, and no sharing of files in any way is allowed on individual assignments and no inter-group sharing is allowed on group assignments. All cases of academic misconduct will be submitted to the Office of Student Conduct. If you are found guilty of academic misconduct in the course, you will be on academic integrity probation.
for the remainder of your years at NCSU and may be required to report your violation on future professional or school applications. More information can be found online at http://www.ncsu.edu/provost/academic_regulations/integrity/reg.htm.

Homework

Students will submit homework individually unless otherwise specified in the assignment (see the above section on “Academic Integrity”). The assignments will either be posted on the course webpage or distributed in class. If a student is unable to attend class, it is their responsibility to determine if an assignment was given. Unless otherwise indicated, all assignments will be due by the start of class on the date they are due, and must be submitted using the course moodle page.

Homework Grading

Homework submissions will be graded according to the criteria outlined in the assignment. Missing components or lateness will be penalized accordingly.

Late Homework

Unless otherwise requested, completed assignments should be turned in by the beginning of the class period on the date they are due. For assignments for which email submission is requested, emails should be sent before the start of the class period on the date they are due. Late assignments will receive a five point deduction for every day late they are up to a maximum of five days. An assignment that is one minute to 23:59 is considered one day late, 24:00 to 47:59 is considered two days late, etc. Any assignments six or more days late will be given a zero.

Exams

This course will have two exams: a midterm and a final. The midterm will be given in class on 10/10. The final exam is scheduled from 1:00pm - 4:00pm on 12/12. Note, the date of the midterm is subject to change at the discretion of the professor.

Attendance

Attendance at class sessions is not required; however, unexcused absences that result in late assignments or missed announcements may negatively affect students’ grades. Documented medical excuses or other excused absences will not adversely affect grades. Conference travel or other scholarly duties discussed well in advance of a missed session may be excused at the discretion of the instructor.

Class Evaluations

Online class evaluations will be available for students to complete during the last two weeks of the semester. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors
will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.

**Students with disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 919-515-7653. See also the web page on disability services for students (http://www.ncsu.edu/dso/).

**Course Format**

This will be a lecture course covering topics in computer game design and game engine design. Students will be given four homework assignments throughout the semester. Additionally, there will be a midterm and a final exam.

**Grading**

Grades will be computed with a weighted average using the following weights.

- Homeworks: 50%
- Midterm exam: 20%
- Final exam: 30%

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<td>A−/B+</td>
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Course grades will be determined as follows:

**Schedule**

The schedule is subject to change pending student interests and background. The official schedule will be kept on the course webpage and updated periodically to reflect changes as the semester progresses. It is the student’s responsibility to check the schedule regularly for changes. The instructor will communicate any changes in deadlines to students in a timely manner via email and/or announcements in class. Note, it is the student’s responsibility to check their official NCSU email address at least once daily and to come to class. Failure to do so does not excuse missed deadlines.