Course Syllabus: CS 48101 Game Engine Concepts  
Spring 2019, CRN 12474

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Delivery: hybrid  
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Course Description

This course provides an introduction to the idea and tools required to build and make additions to a game engine. It is a required course for the BS in CS with a Game Programming Concentration, and also counts as an upper division elective for the BS, BA, and minor degrees in computer science. The concepts developed in this course are part of the broader area of virtual environment programming that allows individuals to collaborate in games, education, device simulation, and business activities in a natural way without being in the same physical location. Quoting Wikipedia:

Virtual environment software can be purposed for any use, from advanced military training in a virtual environment simulator to virtual classrooms. Many Virtual Environments are being purposed as branding channels for products and services by enterprise corporations and non-profit groups.

Currently, virtual event and virtual trade show have been the early accepted uses of virtual event services. More recently, virtual environment software platforms have offered choice to enterprises – with the ability to connect people across the Internet. Virtual Environment Software enables organizations to extend their market and industry reach while reducing (all travel-related) costs and time.

This course is organized into 1-2 week modules that include tutorials, documentation, and assignments on game programming topics such as game graphics, rendering, game physics, game networking, and game AI.

Course Times and Location

This is a hybrid, 15 week course. There will be some face-to-face meetings listed on blackboard. All assignments have due dates; please refer to the course schedule located within the course.

Prerequisites

CS 23001 or equivalent.

Course Goals

By the end of this course, you will:
1. Understand the basic structure of game engine.
2. Understand game mathematics.
3. Understand the basic theory, types, and implementation of scene mangers.
4. Understand the basic theory and implementation of game lighting.
5. Understand the basic theory and implementation of game physics.
6. Understand the basic theory and implementation of resource managers.
7. Understand the integration issues associated with game engine development using multiple software libraries.

Course Learning Outcomes

By the end of the course, you will be able to:
1. Build a virtual environment project combining various game engine modules.
2. Write programs using a professional render engine.
3. Write programs using a professional game engine together with a physics engine.
4. Learn how to use environment variables to simplify distributing code.
5. Learn to use the features of Microsoft Visual Studio to simplify game engine development.

Learning Materials

The Ogre 3d render engine and Bullet physic engine, both free online, and Visual Studio Community 2013, also free.


Technology Requirements and Skills

Computer Hardware and Software

Students new to Kent State University should review Information Service’s Technology Viewbook. A personal computer with consistent, reliable Internet access is required:

1. A DSL or cable connection to the Internet; dial-up is not sufficient.
2. Laptop or desktop computer with a minimum of a 2 GHz processor and 8 GB of RAM

You should have one of the following computer operating systems and additional software applications installed on your computer:

1. Windows 7 or 10 system operating software for PC computers (recommended) OR Mac 10.7 or higher for Apple Mac computers.
3. A free version of Microsoft Office is available for students. Instructions and information can be found on support.kent.edu.
4. Antivirus for Windows OS, Microsoft Security Essentials OR Antivirus for Mac OS, Sophos
5. A Blackboard Learn compatible browser, such as the latest version of Mozilla Firefox. Blackboard also supports Chrome and Safari. Internet Explorer is NOT a supported browser and should not be used.
Technology Skills

Programming at the level of a CS II including procedural and class programming and recursion. The ability to use an IDE to develop programming projects. The ability to use a search engine to find help and documentation on programming projects.

Blackboard (Bb) Learn

This class will use Blackboard (Bb) Learn, the official learning management system (LMS) used by Kent State University to deliver course materials to university students. ALL course materials and activities will take place in Bb Learn.
In order to login to the online Bb Learn LMS, students will need a Kent State FlashLine User Name ID and password.
- Students can login to Bb Learn either through a student FlashLine account or via a direct link to the login page: http://learn.kent.edu
For help using the Blackboard (Bb) Learn system use the “Blackboard Help” link in the main navigation. Help can also be found on the Kent State Blackboard support website: http://www2.kent.edu/is/resources/elearning/student/tutorials/index.cfm

In general, Bb Learn works best using the latest version of most major web browsers, including Firefox, Chrome and Safari. For a complete list of supported web browsers, please follow the link the to KSU Blackboard support web site: http://www2.kent.edu/is/resources/elearning/student/gettingstarted/index.cfm

Programming Help Guidelines

A. 1- Day Rule: When you encounter struggles compiling/linking/syntax in this course give yourself about 24 hours to ‘figure it out.’ If you cannot, then post a message to the discussion board; your peers may have suggestions to assist you. As a last resort, contact me.
B. When sending me email requesting help with programming issue use the following guidelines:
   1. Upload your your entire project to the class SVN and give a compute URL reference to it location.
   2. List the steps or describe the circumstance that preceded the programming issue or error. Include the exact wording of the error message.
   3. When possible, always include a screenshot(s) demonstrating the programming issue or error message.
   4. Also include what debugging tools you have used to find the problem.

Policies and Expectations

Online Attendance Policy

Online courses are conducted on the premise that regular attendance requires students to log into the Bb Learn learning management system (LMS). Attendance is measured both by virtual presence in the online course and student interaction with course learning materials and assignments. Students are expected to check their Kent State e-mail and to log into the system multiple times (at least every other day) during the week.

All actions by students in the Bb Learn LMS can be tracked. At any time during the course, an instructor may generate a report that indicates when and how long individual students have been logged into the LMS, or engaged with course materials or course tools.
Students who anticipate an absence from the online course due to technical or medical reasons should consult with the instructor individually. An absence due to illness or injury requires verification from a medical professional and should be presented to the instructor.

**Communication Policy**

1. Email course questions and personal concerns, including grading questions, to me privately using your@kent.edu email. Do NOT submit posts of a personal nature to the discussion board.

2. Email will be checked at least twice per day Monday through Friday; Saturday and Sunday, email is checked once per day. During the week, I will respond to all emails within 24 hours; on weekends and holidays, allow up to 48 hours. If there are special circumstances that will delay my response, I will make an announcement to the class.

3. Student Forum/Q&A discussion boards will be checked twice per day Monday through Friday; Saturday and Sunday, these discussion boards will be checked once per day.

4. For questions related to University technology, please contact: 330-672-HELP for 24/7 support. Technical questions about Unity should be directed to the class discussion boards.

**Online Student Conduct and (N)etiquette**

Communicating appropriately in the online classroom can be challenging. In order to minimize this challenge, it is important to remember several points of “internet etiquette” that will smooth communication for both students and instructors:

1. Read first, Write later. Read the ENTIRE set of posts/comments on a discussion board before posting your reply, in order to prevent repeating commentary or asking questions that have already been answered.

2. Avoid language that may come across as strong or offensive. Language can be easily misinterpreted in written electronic communication. Review email and discussion board posts BEFORE submitting. Humor and sarcasm may be easily misinterpreted by your reader(s). Try to be as matter-of-fact and professional as possible.

3. Follow the language rules of the Internet. Do not write using all capital letters, because it will appear as shouting. Also, the use of emoticons can be helpful when used to convey nonverbal feelings.

4. Consider the privacy of others. Ask permission prior to giving out a classmate’s email address or other information.

5. Keep attachments small. If it is necessary to send pictures, change the size to an acceptable 250kb or less (one free, web-based tool to try is picresize.com).

6. No inappropriate material. Do not forward virus warnings, chain letters, jokes, etc. to classmates or instructors. The sharing of pornographic material is forbidden.

**NOTE:** The instructor reserves the right to remove posts that are not collegial in nature and/or do not meet the Online Student Conduct and Etiquette guidelines listed above.
University Use Of Electronic Email

A university-assigned student e-mail account is the official university means of communication with all students at Kent State University. Students are responsible for all information sent to them via their university-assigned e-mail account. If a student chooses to forward information in their university e-mail account, he or she is responsible for all information, including attachments, sent to any other e-mail account. To stay current with university information, students are expected to check their official university e-mail account and other electronic communications on a frequent and consistent basis. Recognizing that some communications may be time-critical, the university recommends that electronic communications be checked minimally twice a week.

Assignments and Grades

A detailed breakdown of course assignments and due dates by lesson module is available as a separate .pdf document that can be accessed in Bb Learn by clicking on the Syllabus & Course Schedule link in the course menu.

Writing Assignments (42% of grade)

Approximately 5-6 programming assignments and a programming project. See the course assignments on Bb for details. See class notes for instructions on submitting assignments.

Discussion Boards (14% of grade)

Approximately every other week you will be required to submit the answers to a set of posted question, and rate the answers of you classmates. Include web links or lecture quotes to justify your answer. Often these questions will require research that goes beyond the material provided in the class notes. A thoughtful answer (when justified by appropriate references) whether correct or not will receive full credit. Careless answers or answers indicating lack of preparation will have points deducted.

Class Project (44% of grade)

Tests and Quizzes
None

Assessment Feedback
Evaluation of a programming assignment normally will be posted on Bb 1-2 weeks after it is due. The discussion board assignment will be normally evaluated by the Tuesday after it is due. Do not rely on the Bd course percentage value to assess your current grade. Use the score on the assignment and the percentage weight to calculate you current grade.

Late and Make-up Work Policy
Assignments more than one week late will not be graded unless you have arranged with the instructor to submit the assignment late. All late programs will have points (at least 10%) deducted from the final score. Any homework submission that is returned for correction must be corrected within one week of the date that correction resubmission was initiated or the corrected submission will be considered to be late.

Assignment of Grades
<table>
<thead>
<tr>
<th>Percentage of Earned Points</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93% -100%</td>
<td>A</td>
</tr>
<tr>
<td>90% -92%</td>
<td>A-</td>
</tr>
<tr>
<td>88% -89%</td>
<td>B+</td>
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<tr>
<td>83%-87%</td>
<td>B</td>
</tr>
<tr>
<td>80% -82%</td>
<td>B-</td>
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<tr>
<td>78% -79%</td>
<td>C+</td>
</tr>
<tr>
<td>73% -77%</td>
<td>C</td>
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<tr>
<td>70% -72%</td>
<td>C-</td>
</tr>
<tr>
<td>68%-69%</td>
<td>D+</td>
</tr>
<tr>
<td>60%-67%</td>
<td>D</td>
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<tr>
<td>Under 60%</td>
<td>F</td>
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**University Policies**

Students are required to be aware of and follow all general and academic policies established by Kent State University. A list of the general academic policies is listed on the online version of the Kent State University Catalog. Specific policies related to the successful completion of this online course can be located and reviewed in your Blackboard Learn course. University policies are located in the Online Student Support Services & University Policies folder contained within the START HERE folder in your Blackboard Learn course.

**Students with Disabilities**

(Revised 6/01/07) University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedures).

Blackboard Learn accessibility statement: http://blackboard.com/Platforms/Learn/Resources/Accessibility/WebCT-Accessibility.aspx

**Course Enrollment and Withdrawal**

https://www.kent.edu/registrar/spring-important-dates

University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be
attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated.

If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you will not receive a grade at the conclusion of the semester for any class in which you are not properly registered. Also, it is your responsibility to check the withdrawal dates for each semester.

Plagiarism and Academic Integrity
Students enrolled in the university, at all its campuses, are to perform their academic work according to standards set by faculty members, departments, schools and colleges of the university; and cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied. For more information: http://www.kent.edu/academics/resources/plagiarism/

Subject to Change Statement
The syllabus and course schedule may be subject to change. Changes will be communicated via email or the Blackboard Learn announcement tool. It is the responsibility of students to check email messages and course announcements to stay current in their online courses.