Course Description  This course is a continuation of CPSC 1010, and continues the emphasis on problem solving and program development. This course examines typical numerical, non-numerical, and data processing problems; and introduces basic data structures.

Prerequisites  CPSC 1010 with a grade of “C” or better.

Course Objectives  This course will broadly cover the following topics:
- Advanced C/C++ Programming
  - Basic parsing
  - Multi-module programs and the Makefile
  - Incremental development and testing
  - Debugging strategies for large programs
  - Emulating inheritance via hierarchical data structures
  - Emulating polymorphism via function pointers
- Computational Linear Algebra
- Raytracing
- Introduction to Object-Oriented Languages and C++

Required Text and Handout Materials
- Handouts and materials linked to on the course webpage:
  http://people.cs.clemson.edu/~levinej/courses/1020

Additional Reference Reading Material
- Any other reasonable C and C++ reference should also suffice
Content

Course Outline

I. Module 1
- Intro / review: pointers, stack & heap memory, dynamic memory
- gdb
- Coordinate systems, points in 3-D, vectors
- Vector operations
- Raytracing intro
- Camera structure
- Model structure
- Materials
- Intro to OOP
- Makefiles
- Polymorphism
- Function pointers
- Planes
- Triangles

II. Module 2
- C++ intro
- List class, camera class, material class
- Friends
- Objects
- Derived classes (inheritance)
- Diffuse Illumination
- Vector class
- Operator/Function overloading
- Plane (finite) class, sphere class
- Spotlight class
- Recursion
- Specular lighting
- Antialiasing
- Transparency
- Textured planes
- Surfaces of revolution
Performance Evaluation

Grades will be assigned based on the following scale:

- **A** ≥ 90%
- **B** ≥ 80%
- **C** ≥ 70%
- **D** ≥ 60%
- **F** < 60%

Grading will be based on performance on the set of programming assignments, labs, midterm exam, final exam, and class participation, using the following percentage distribution:

- Programming Assignments: 35%
- Labs: 10%
- Midterm Exam: 20%
- Class Participation: 10%
- Final Exam: 25%

**Programming Assignments**  
There will be five programming assignments given during the semester, each worth varying point values. Details about the assignments will be announced in class. Unless otherwise explicitly stated, assignments are to be your own individual, unaided (except by the instructor or the TA) work, and not to be shared with anyone, including students in other sections.

As a general rule, I may not be able to answer all the emailed questions that are sent within the 24 hour period immediately preceding the due date of an assignment. I will try my best. Please get started early on assignments, and take advantage of the TAs office hours (which will be posted early in the semester), the tutor (information to follow on that as well), in addition to my office hours.

Assignments may be submitted late for up to 72 hrs after the due date. Each late submission will receive a penalty of 10% per day for each work day it is late. After 3 days, the assignment will receive a zero.

In many cases, with this course especially, the assignments build on the previous assignment, so not finishing an assignment and just moving on to the next one will not be an option in this class.

**Labs**  
Weekly lab sections help you regularly practice coding and also contribute to your programming assignments. The lab sections for this semester are:

- 2:00 – 3:50 pm T 110E
- 4:00 – 5:50 pm T 110D
- 2:00 – 3:50 pm R 110E
- 6:00 – 7:50 pm R 110D
- 8:00 – 9:50 pm T 110E
- 8:30 – 10:20 pm W 110E

Unless otherwise instructed by your lab TA, lab attendance is expected and required. Labs begin the week of January 12th. The complete lab schedule can be found on the course webpage.
Midterm Exam  There will be one exam during the semester given around midterm and covering Module 1. Attendance is mandatory on exam day. A missed exam will receive a grade of zero (0).

Class Participation  The class participation grade is the instructor’s subjective judgement of the student’s contribution to a lively classroom atmosphere. He will consider mainly active, informed participation in classroom discussions, quiz and homework reviews. Obviously, students not attending class are not contributing in this way.

One component of the participation grade will be periodic quizzes randomly given at the start of class. Additionally, participation in online forums on Piazza may also contribute to your grade.

Final Exam  The final exam will be cumulative. However, if you receive an A average across all work recorded on or before the last day of the semester, you will receive a final exam exemption. Note that some assignments, particularly those turned in toward the end of the semester, might not be graded until after the final exam. Hence, although unlikely, it is possible to receive a B in the course after having opted out of the final exam.

Note that if you are not exempt from the final, a missed exam will receive a grade of zero.

Grade Appeal  Any grade challenge regarding assignments, quizzes, or exams must be emailed to the instructor, with detailed justification, within one week of the date the grades are available.

Academic Success Center Tutoring  Free tutoring is available through the Academic Success Center. Tutoring should be used to discuss course materials and ask questions but not as a replacement for class or office hours. Drop-in sessions will be available weekly in the Academic Success Center Building. Make sure to come to all tutoring sessions fully prepared with your book, notes, and other class materials.

ASC tutors are not allowed to work on graded assignments. A list of policies for tutoring are located on their website: http://www.clemson.edu/asc.
Policies

Late Instructor  Your instructor will make every effort to be in class on time, or to inform you of any delay or cancellation. In the unusual event that he should not arrive in class or send word by 15 minutes from the class start time, the class is officially cancelled.

Attendance  Note that a percentage of the grade is based on class participation. Regular and punctual attendance at all class sessions is required and expected. Also note that with this class, like others, each lecture builds upon preceding lectures. Missing even a single class can make it difficult to keep up with the course material.

Weekly lab attendance is required. Attendance is mandatory on exam days. No make-up exams or quizzes will be given. If you arrive late on the day of a quiz or exam, you will be allowed to participate, but will not be given additional time to compensate for being tardy.

Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor within 24 hours of the weather related cancellation.

Collaboration Yes, Plagiarism No  In this course, we want to encourage collaboration and the free interchange of ideas among students and in particular the discussion of homework and quiz problems, approaches to solving them, etc. However, we do not allow plagiarism, which, as commonly defined, consists of passing off as one’s own ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism also applies to using work and materials from those outside of the class. The same rules apply whether you are asking a friend, unknown student who is not in the class, or another student in this course.

Unless otherwise instructed, you are expected to work independently on projects and labs. The instructor may use automated tools to look for similarities in code which could indicate plagiarism. Instances of copying or sharing, or cheating in any way will result in an academic dishonesty charge, which can lead to an F in the course or expulsion from the university. Each student is responsible for protecting his or her files and work from access by others. Work that is essentially the same and submitted without proper attribution is considered to be a violation of academic dishonesty policies by all those submitting the work, regardless of who actually did the work. For this course, it is considered cheating to do any of the following:

• Discuss in detail the code in your program with another person (other than the instructor or the lab TAs)
• Use code obtained from another student, or any other unauthorized source, either modified or unmodified (each student is responsible for protecting his or her files from access by others)
• Use reengineering tools
• Submit work of others, from the Internet or any other source
• Use unauthorized aids on exercises, quizzes, or exams

Publicly available sources for code or other material, in small amounts, may be freely used if appropriately attributed. A good rule of thumb: when in doubt about whether the use of small snippets of code not your own in a programming assignment or lab assignment is allowed, first ask the instructor or lab TA.
Copyright  Materials in this course are copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy on the Clemson University website. Additional information is detailed at http://libguides.clemson.edu/copyright/.

Disability Access  It is university policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students with disabilities requesting accommodations should make an appointment with Dr. Arlene Stewart (656-6848), Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Students are encouraged to contact Student Disability Services, Suite 239 in the Academic Success Center, 656-6848, to discuss their individual needs for accommodation. Accommodations are individualized, flexible, and confidential and are based on the nature of the disability and the academic environment, in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Details on policies and procedures are available at http://www.clemson.edu/sds/.

Title IX (Sexual Harassment)  Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. The policy is located at http://www.clemson.edu/campus-life/campus-services/access/non-discrimination-policy.html and http://www.clemson.edu/campus-life/campus-services/access/title-ix/.

Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, and he may be reached at knightl@clemson.edu, 864.656.3181 (voice), or 864.565.0899 (TDD).

Academic Integrity  As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a “high seminary of learning.” Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity.

For more details, refer to Universitys statement on academic integrity at http://www.clemson.edu/administration/student-affairs/student-handbook/universitypolicies/