1. Instructor Information

Dr. Yuzhong Shen, Associate Professor
Department of Modeling, Simulation, and Visualization Engineering
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Office Hours:
2:00 PM – 3:30 PM, Monday and Tuesday, or by appointment.

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2. Course Description

MSIM 441/451 and ECE 406/506 Computer Graphics and Visualization provides a practical treatment of computer graphics and visualization with emphasis on the usage of application programming interface (API) libraries for modeling and simulation applications. It introduces computer graphics fundamentals, including mathematical foundations, rendering pipeline, geometrical transformations, 3D viewing and projections, lighting and shading, texture mapping, etc. Interactive visualization software architecture for modeling and simulation and visualization principles based on perception are both discussed in depth with case studies.

3. Textbooks

Required:

Optional:
4. **Software**

The following software packages will be used by this course. Among them, only OpenGL and GLUT are absolutely required and students can use equivalents of the rest software packages.

- OpenGL for graphics programming
- GLUT for user interface development
- Microsoft Visual C++ 2010 (preferred) or 2012
- Microsoft Windows 7 or 8

I will use ODU Blackboard Learning System to distribute most teaching materials and collect student submissions. Students are required to use their ODU email accounts to access Blackboard for this course.

5. **Prerequisites**

Basic mathematical preparations in linear algebra (matrix operations), geometry, trigonometry, and calculus are required. The ability to program in C++ programming languages (CS 250) is required. Students without the prerequisite are required to complete relevant mathematics and computer programming courses first before taking this course.

6. **Course Objectives**

Upon successful completion of Computer Graphics and Visualization, students should be able to understand essential concepts and develop applications in the following areas:

- Computer graphics fundamentals
- Programming in OpenGL
- Visualization for modeling and simulation
- Visualization principles based on perception

7. **Assignments and Grading**

Students enrolled in MSIM 541 and ECE 506 will have additional tasks for homework and programming assignments.

- **Written homework** 20 points  
  Due at 12:00 PM Wednesday before next lecture; NO late submission.

- **Programming Assignments** 60 points  
  NO submission is accepted 2 weeks after the due day; 20% penalty for each late week.

- **Midterm Exam** 20 points

8. **Attendance**

As per university policy, students are expected to attend classes. Students should notify instructors in advance when a class will be missed. In the event of an emergency that causes a class to be missed, instructors must be notified as soon as possible. Students who must miss a class are responsible for all information and announcements provided during class. Classes are expected to begin on time, and students will respect the time boundaries established by the professor.
9. University Email Policy
The Old Dominion University e-mail system is the official electronic mail system for
distributing course-related communications, policies, announcements and other information.
Students should activate their Old Dominion University e-mail accounts and check them
before each class. If the student chooses to have his/her messages forwarded to another
account, it is the student’s responsibility to take the necessary steps to have them forwarded.

10. Withdrawal
A syllabus constitutes a contract between the student and the course instructor. Participation
in this course indicates your acceptance of its teaching focus, requirements, and policies.
Please review the syllabus and the course requirements as soon as possible. If you believe
that the nature of this course does not meet your interests, needs or expectations, if you are
not prepared for the amount of work involved or if you anticipate that the class meetings,
assignment deadlines or abiding by the course policies will constitute an unacceptable
hardship for you, you should drop the class by the drop/add deadline, which is located in the
ODU Schedule of Classes.

11. Honor Pledge
By attending Old Dominion University you have accepted the responsibility to abide by this
code. This is an institutional policy approved by the Board of Visitors. The honor code is as
follows:

   I pledge to support the honor system of Old Dominion University. I will refrain from any
   form of academic dishonesty or deception, such as cheating or plagiarism. I am aware
   that as a member if the academic community, it is my responsibility to turn in all
   suspected violators of the honor system. I will report to Honor Council hearings if
   summoned.

12. Special needs
In compliance with PL94-142 and more recent federal legislation affirming the rights of
disabled individuals, provisions will be made for students with special needs on an
individual basis. The student must have been identified, as "special needs" by the university
and an appropriate letter(s) must be provided to the course instructor. Provision will be made
based upon written guidelines from the university "special needs students" resource office.
All students are expected to fulfill all course requirements.

13. Course Disclaimer
Every attempt is made to provide a syllabus that is complete and that provides an accurate
overview of the courses. However, circumstances and events may make it necessary for the
instructor to modify the syllabus during the semester. This may depend, in part, on the
progress, needs, and experiences of the students.

14. Course Outline (Tentative)
The following topics are planned for this course.
1. Course Introduction
2. Graphics Systems and Models
3. A Math Primer for Computer Graphics
4. Color Models and Application of Color in Visualization
5. Graphics Programming and Introduction to OpenGL
6. Visualization Software Architecture and User Interactions
7. Geometric Objects and Transformations
8. Viewing and Space Perception
9. Lighting and Shading
10. Discrete Techniques and Pattern Perception
11. Modeling and Hierarchy
12. Visualization and Case Studies
13. 3D Modeling and Animation Software: Maya