

**NUSRI Summer Programme 2016**

**RI3004A**  
**3D Graphics Rendering**

**Lecture 0**  
**Course Info**

**School of Computing**  
**National University of Singapore**

# Lecturer

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# Teaching Assistant

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# Course Scope & Objectives

- Broad introduction to 3D Computer Graphics
- Two main categories
  1. Real-time interactive 3D computer graphics
    - Raster graphics; Use OpenGL API
  2. Offline rendering with global illumination
    - E.g. ray tracing, path tracing, radiosity
- This course provides a general treatment of real-time and offline rendering techniques in 3D computer graphics. After the course, students are expected to understand basic computer graphics terminology and concepts, and be able to design and implement simple 2D and 3D interactive computer graphics programs, and realistic global illumination applications

# Syllabus (Tentative)

- Introduction to 3D Computer Graphics
- OpenGL Programming
- Input and Interaction
- Geometric Objects & Transformations
- Viewing
- Clipping, Rasterization & Hidden-Surface Removal
- Illumination and Shading
- Texture Mapping & Shadows
- Ray Tracing
- Local Reflection Models
- Global Illumination (includes Path Tracing and Photon Mapping)
- Radiosity Methods

# Prerequisites

- Good programming skills in C or C++
- Basic Data Structures
  - E.g. arrays, linked lists, trees
- Basic Vector Operations
  - E.g. dot product, cross product
- Simple Linear Algebra
  - E.g. matrix multiplication, matrix transpose
- Basic Trigonometry
- Basic Calculus concepts

# Assessments

- **Four Programming Assignments: 70%**

- Assignment 1: 8%
- Assignment 2: 12%
- Assignment 3: 25%
- Assignment 4: 25%

- **Final Test: 30%**

- Final test is open-book

- **Plagiarism is a serious offense**

# Daily Schedule

- Lecture

- 10:15 AM – 1:15 PM

- Discussion

- 2:30 PM – 3:30 PM



# Course Schedule (1)

## ■ Day 1, 14/7/2016, Thursday

- Lecture 0: Course Info
- Lecture 1: Introduction to 3D Computer Graphics
- Lecture 2: OpenGL Programming

## ■ Day 2, 15/7/2016, Friday

- Lecture 3: Input & Interaction
- Lecture 4: Geometric Objects & Transformations
- **Assignment 1** starts

# Course Schedule (2)

## ■ Day 3, 16/7/2016, Saturday

- Lecture 5: Viewing
- Lecture 6: Rasterization & Hidden-Surface Removal
- **Assignment 2** starts

## ■ Day 4, 18/7/2016, Monday

- Lecture 7: Illumination and Shading
- **Assignment 1** due 11:59 PM

# Course Schedule (3)

## ■ Day 5, 19/7/2016, Tuesday

- **Lecture 8**: Texture Mapping & Shadows
- **Assignment 2** due 11:59 PM
- **Assignment 3** starts

## ■ Day 6, 20/7/2016, Wednesday

- **Lecture 9**: Ray Tracing
- **Assignment 4** starts

# Course Schedule (4)

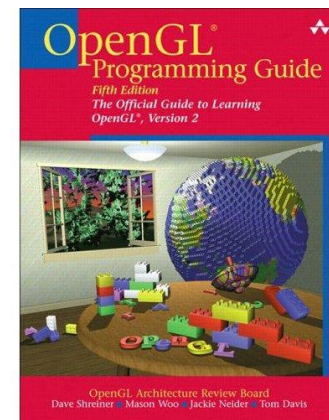
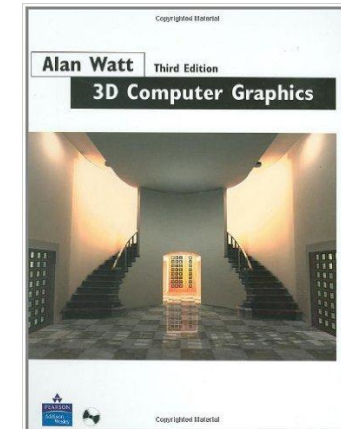
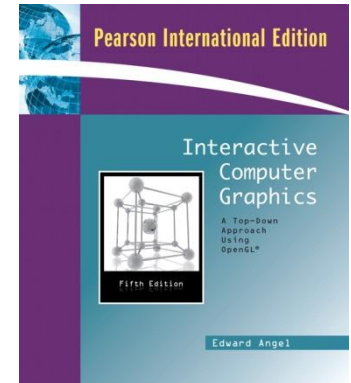
- Day 7, 21/7/2016, Thursday
  - Lecture 10: Local Reflection Models
- Day 8, 22/7/2016, Friday
  - Lecture 11: Global Illumination
- Day 9, 23/7/2016, Saturday
  - Lecture 12: Radiosity Methods (tentative)
  - **Assignment 3** due 11:59 PM

# Course Schedule (5)

- Day 10, 25/7/2016, Monday
  - Final Test (10:30 AM – 12:30 PM)
  - **Assignment 4** due 11:59 PM

# Reference Books

- Interactive Computer Graphics: A Top-Down Approach Using OpenGL, 5<sup>th</sup> Edition  
by Edward Angel
- 3D Computer Graphics, 3<sup>rd</sup> Edition  
by Alan Watt
- The OpenGL Programming Guide  
(The Redbook), Addison-Wesley
  - 2<sup>nd</sup> Edition is freely available online at  
<http://www.glprogramming.com/red/>



**End of Lecture 0**