Introduction to Computer Graphics

Course Overview
课程概述

Overview (课程概述）

- Theory + Technology
  - Introduce the basic knowledge about computer graphics (理论)
  - Including teaching the OpenGL (a tool to write your 3D programs) （技术）

Overview (课程概述）

- 学分（ 3+1（数媒）/ 2+1(软工) ）
  - 理论学分　3/2
    - 时间：

      数媒：每周周三1、2节；每单周周四7、8节

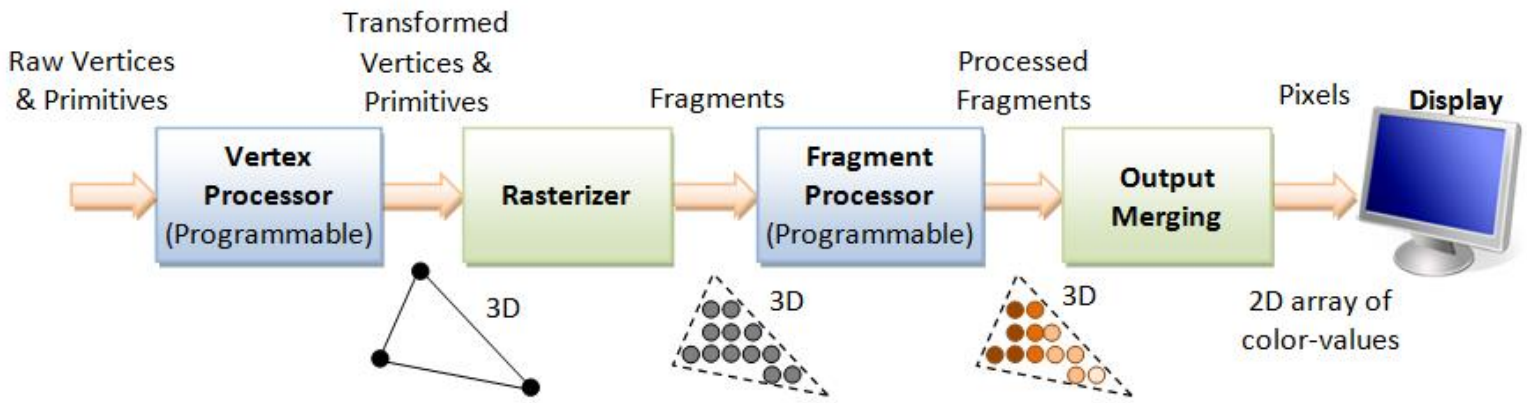
      软工：每周周三3、4节
  - 实验学分　1
    - 时间：

      数媒：每双周四7、8节

      软工：每双周四9、10节
  - Requiring hard work (about 2h/w to learn, 3h/w to practice)
    建议每周用时 2小时学习，3小时训练编码

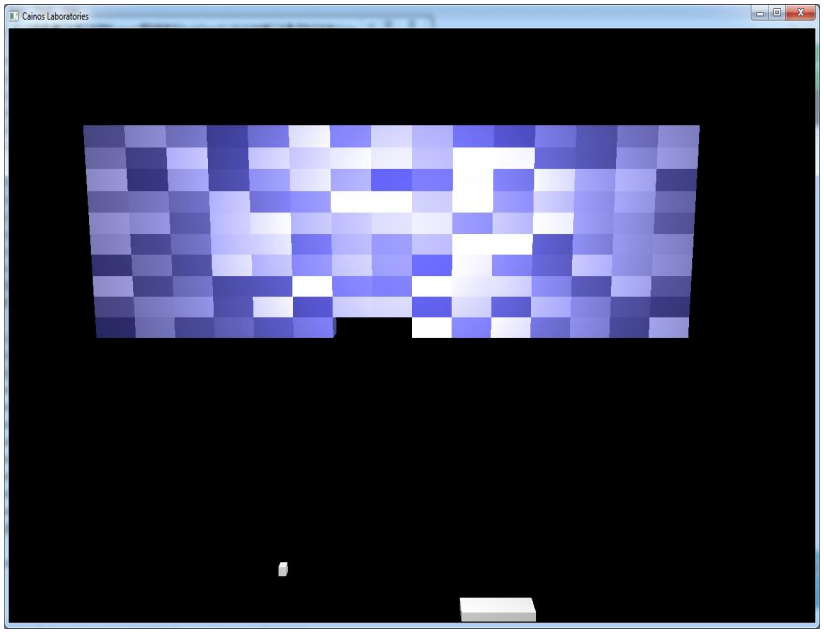
Objectives （课程具体目标）

- Broad introduction to Computer Graphics
  - The generation procedure of a image using a computer (用计算机生成一张图片的过程)
  - Introduce the details of the key stages of the rendering pipeline
  - Introduce the details of how to represent or organize a scene



Objectives （课程具体目标）

- OpenGL based course
  - to write a 3D program (怎样写一个3D程序）



Objectives （课程具体目标）

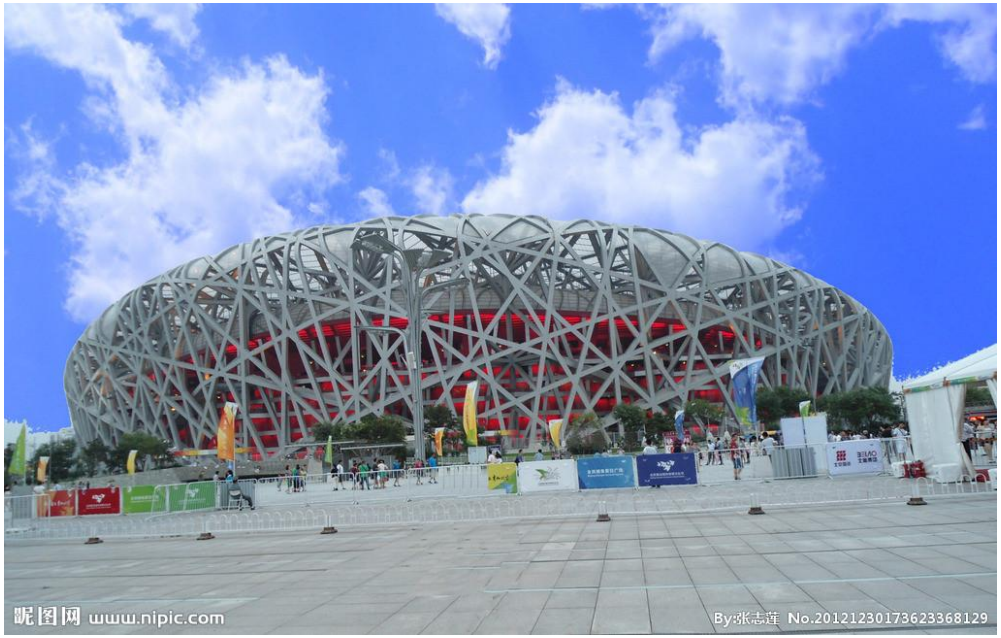
- Introduce the latest techniques on computer graphics
  - 3D Printing
  - Virtual Reality Glass
  - 3D Movies
  - …

Prerequisites (先修条件)

- Good programming skills in C (or C++)
  - 热爱编程，编程基础扎实
- Basic Data Structures （数据结构基础）
  - Linked lists
  - Arrays

Prerequisites (先修条件)

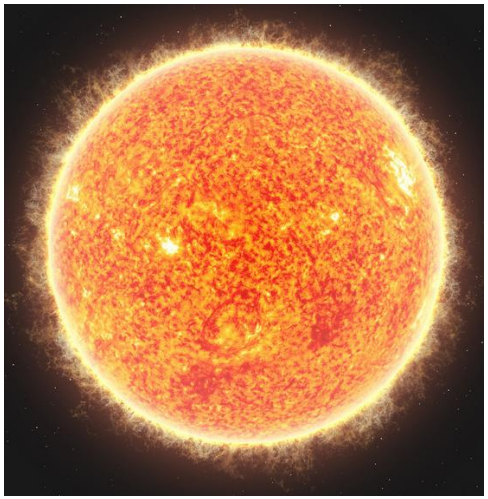
- Geometry （空间几何的直觉）



Prerequisites (先修条件)

- Solid Linear Algebra（扎实的线代功底）

$$M = \begin{bmatrix} ? & ? & ? \\ ? & ? & ? \\ ? & ? & ? \end{bmatrix}$$

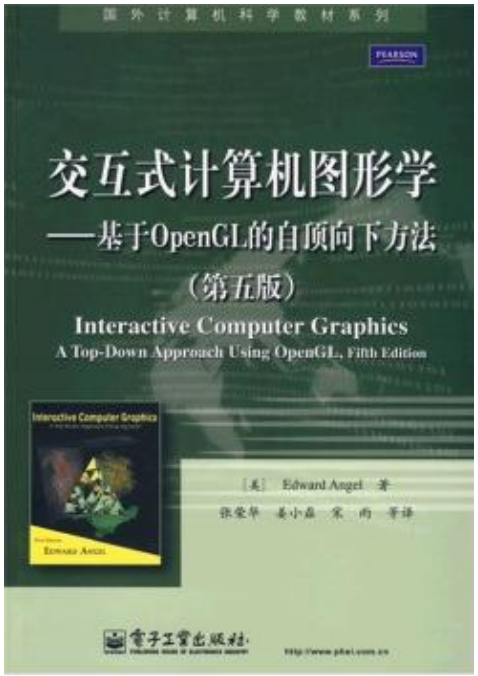


Grading policy (评分标准)

- 4~6 Experiments 55%
  - Interactive
  - 3D
- Exam: 40%
- Attendance 出勤 5%

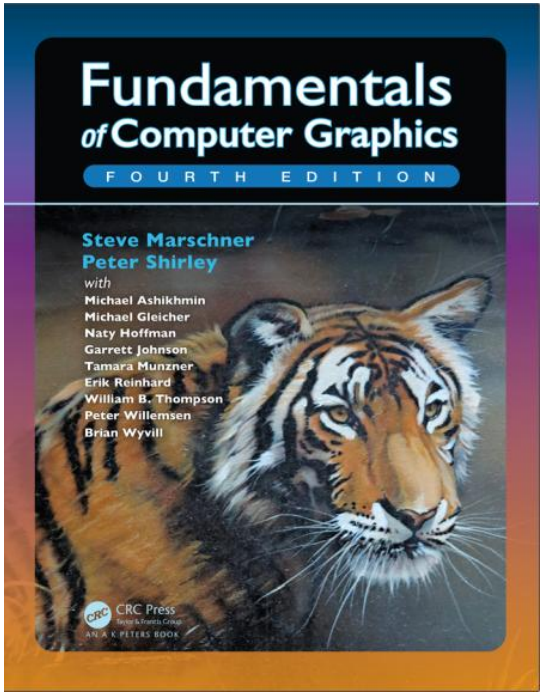
Textbook(教材）

- Interactive Computer Graphics - A Top-Down Approach 5th Edition （主教材）
  - 中文版《交互式计算机图形学-基于OpenGL的自顶向下方法》第5版



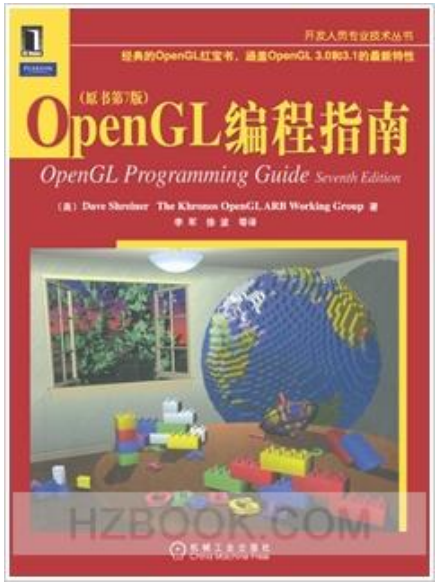
Textbook(教材）

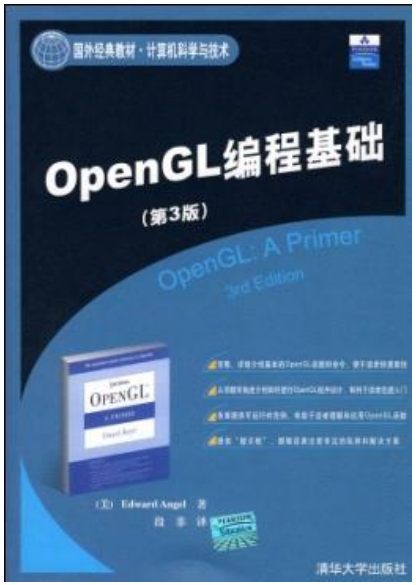
- Fundamentals of Computer Graphics 4th Edition （辅助材料）（The Tiger Book）
  - 计算机图形学基础（第四版）



References (参考资料)

- The OpenGL Programmer's Guide (the Redbook) 7th Edition
  - OpenGL编程指南 第七版 （俗称红宝书）
- OpenGL A Primer 3rd Edition
  - OpenGL编程基础 第三版





Resources

- Teaching Ftp
  - ftp://121.192.180.66/
- QQ Group
  - 数媒： 682542425
  - 软工： 122954532

Outline: Part 1

- Part 1: Introduction
- Contents
  - What is Computer Graphics?
  - Applications Areas
  - History
  - Image formation
  - Basic Architecture

Outline: Part 2

- Part 2: Basic OpenGL
- Contents
  - Architecture
  - GLUT
  - Simple programs in two and three dimensions
  - Interaction

Outline: Part 3

- Part 3: Three-Dimensional Graphics
- Contents
  - Geometry
  - Transformations
  - Homogeneous Coordinates
  - Viewing
  - Lighting and Shading

Outline: Part 4

- Part 4: Implementation
- Contents
  - Approaches (object vs image space)
  - Implementing the pipeline
  - Clipping
  - Line drawing
  - Polygon Fill
  - Display issues (color)
  - Implementing a basic raytracer

Outline: Part 5

- Part 5: Geometry and Other Graphics Technologies
  - Bezier Curve
  - Point Cloud
  - Mesh
  - Animation
  - …