Introduction to Computer Graphics

COMP 30033J

Applications

- Films

- Games

- Medical & Scientific Visualization

- Human-Computer Interaction

- Virtual & Augmented Reality

- &c., &c.

Major Fields

- Computer Graphics: rendering images

- Image Analysis: interpreting images

- Computer Vision: copying the eye

- Human-Computer Interaction

- Common factor: human visual system

Computer Graphics

- Teaching computers to draw

- Creating synthetic realistic images

- Computers are mathematical

- We use mathematics for drawing

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Course Description

- Physics and biology of vision; mathematical foundations of computer graphics; geometric modelling of the world; geometric transformations; perspective & orthographic projections; models of computer rendering; animation; surface modelling; lighting, colour and textures; clipping, culling and compositing; performance optimization; modelling natural phenomena.

Unfortunately, . . .

- Graphics depends on mathematics:

  - Geometry

  - Linear Algebra

  - Calculus

- You have been warned!

Course Evaluation

- 60% final exam

- 40% practicals

  - 3 assignments (15%)

  - 2 small projects (25%)
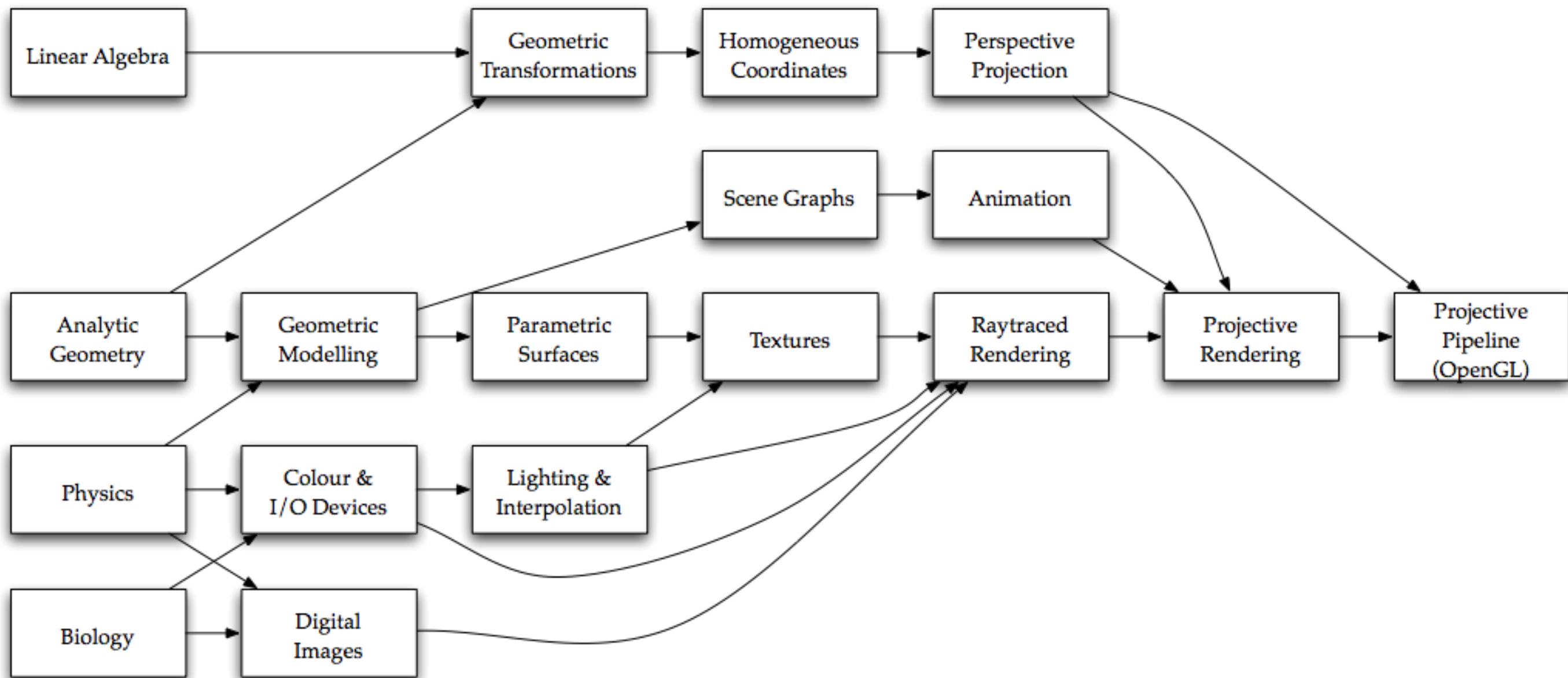
  - Subject to change

Software & Hardware

- The practicals in this course will use:

    - OpenGL

- The practical's especially the later assignments require a recent video card.

Block Diagram

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list of topics to be covered

Topic 1: Introduction / Graphics History

Topic 2: Physics & Biology

Topic 3: Linear Algebra

Topic 4: Linear Algebra using Objects

Topic 5: Lines

Topic 6: Rasterization

Topic 7: Geometric Modelling

Topic 8: OpenGL & the Projective Pipeline

Topic 9: Projective Transformations

Topic 10: Animation

Topic 11: Textures

Topic 12: Colour

Topic 13: Lighting

Topic 14: Curves & Circles

Topic 15: Bézier Curves

Topic 16: Homogeneous / Perspective

Topic 17: Coordinate Systems

Topic 18: GUI programming & Interaction

Topic 19: Frame buffer (Blending & Compositing)

Topic 20: Optimization

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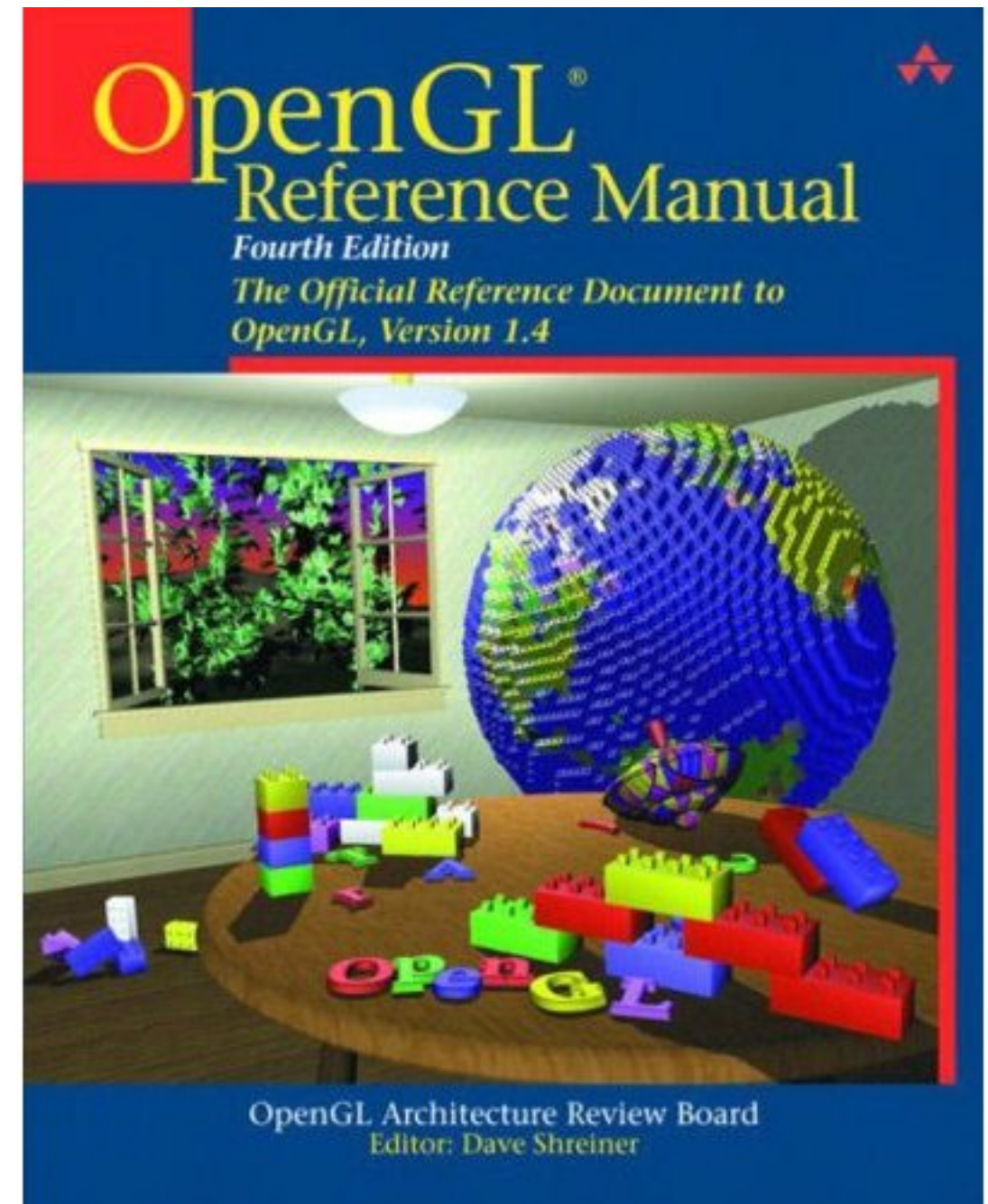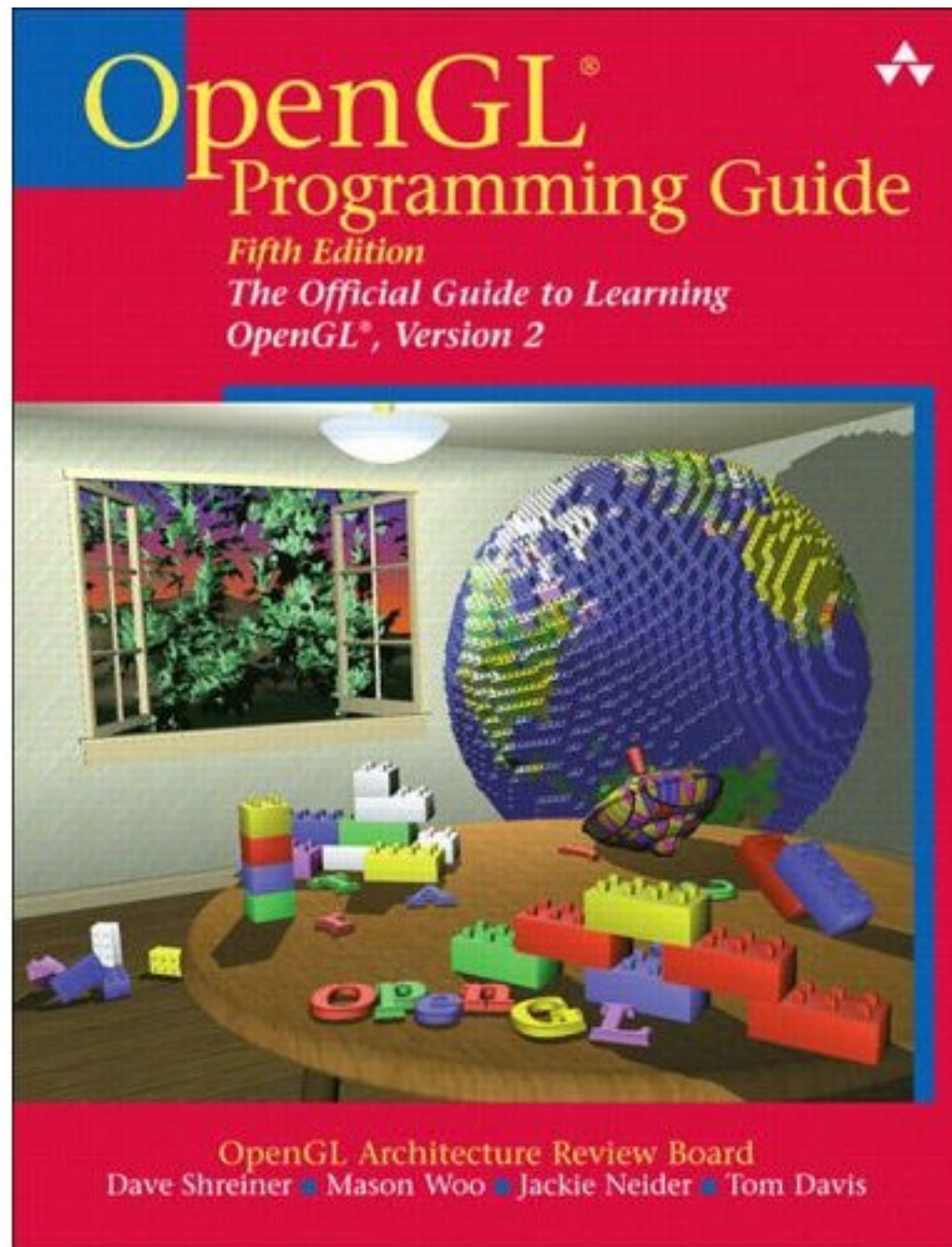
Images from Amazon.com (REMEMBER its 2.0 VERSION

COMP 30033J: Intro Computer Graphics

3D Game Engine Design:

A Practical Approach to

Real-Time Computer Graphics

2nd Edition

by David H. Eberly

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