

# Foundations of 3D Scene Modeling

# Syllabus: where we are

Cornerstones of image generation:

- **3D scene**
- Rendering algorithm
- Raster image

<IMAGE: high-level overview  
of three main components>

<IMAGE: tree-like structured knowledge of the  
course>

# Introduction

Elements of any 3D scene:

- 3D model(s)
- Light source(s)
- Camera(s)

<IMAGE: high-level overview  
of three main components>

# 3D scene

- 3D scene modeling goes hand in hand with object oriented design.
- 3D scene representation has inherent tree-like structure thus often represented with so called **scene-graph**
  - Book: Foundations of Game Engine Development: Rendering (E. Lengyel)
  - Scene modeling tools: DCC examples

<IMAGE: COMPONENTS OF 3D SCENE AND SCENE GRAPH>

# 3D scene as a node graph

- 3D scenes, depending on application, can be extremely large.
- Elements of a 3D scene can be also seen as nodes and categorized into a diverse group of specific types based on their function in a scene.
- Root
  - 3D object
    - Shape
      - Mesh
    - Material
      - Scattering function
      - Texture
    - Collision shape
  - Camera
  - Light
- Example of production scene representation: <https://github.com/appleseedhq/appleseed/wiki/Project-File-Format>

# 3D objects

- How do we represent a 3D object in a computer?
- How we create a 3D object for 3D scene?
- How do we manipulate 3D objects?

# Complex scene

<**IMAGE**: An motivation  
image that we will  
understand by the end of the  
lecture.>

# Literature

- <https://github.com/lorentzo/IntroductionToComputerGraphics/wiki/Foundations-of-3D-scene-modeling>