

visual perception, rods, cones

**rod/cone sensitivity, reflectance, metamers**

**SPD vs perceived color**

**Mach bands**

color planes in an image

rgb, hsv, cmy, yiq

gamut

extract brightness using YIQ matrix

**salt and pepper noise, impulse noise, gaussian noise**

**convolve this kernel with this image - resulting pixels? resulting image?**

**mean blur, gaussian blur, gradient, scale**

**mean vs median filter, normalize filter weights**

**edge detection**

threshold

**transformations: 2D, 3D**

**order of transformations - global coord system, local changing coord system**

**scale, reflect, shear, rotation matrices and their effects**

**homogeneous coords**

given opengl method calls show the associated transformation matrices

**dot product - draw it, calculate it, use it**

**cross product - draw it, calculate it, use it**

model hierarchies - instances at nodes, transformations along edges

world space to eye space is a translation and a rotation, give the matrix to do it

parallel projection, perspective projection, vanishing points

hidden surfaces, z-buf, ray casting

**Phong illumination model, Gouraud vs Phong interpolation**

**ray tracing, generate the rays, use them to calculate shading**

**refraction, Snell's law**

intersection ray-plane, ray-sphere, ray-something

super-sample, average down, adaptive sampling

distribution ray tracing, effects from distributing rays in space and time

texture mapping

u,v mapping

**bilinear interpolation**, interpolation using barycentric coords

pre-filtered texturing - mip mapping, summed area tables

displacement mapping, bump mapping

environment mapping

**parametric curves**

**given Bezier control points, draw  $Q(u)$ ,  $Q(k)$ , convex hull**

**connect Beziers with  $C^0$ ,  $C^1$ ,  $C^2$  continuity**

**construct Bezier control points using Catmull-Rom technique**

**construct Bezier control points using deBoor points (B-spline)**

construct Bezier, B-spline surface

**particle systems - basic pseudo code operation**

**forces**

**animation principles**