Session 01: Fundamentals to Digital Design
Monday, August 6, 2018 2:59 PM

Grasshopper
- Non Parametric vs Parametric
- Interface
  - Parameters and components
  - Objects
  - Connection
  - Object status
- Systems
  - Coordinate systems
  - Data matching: practice
  - Data structure: practice
- Parameter
- Math
- Set
- Vector
- Curve
- Surface
- Mesh
- Intersect
  - Mathematical vs physical: practice
- Transform
  - Euclidean, Affine, Morph: practice
- Display

Geometry
- Point, Vector and Line
  - Point
    - Setting a point
    - Kinds: 2d, 2f, 3d, 3f, 4d (4d with weight)
    - Operators: practice
    - Interchangeable with vectors: start(0,0,0), end(self), direction and magnitude: practice
  - Vector
    - Setting a vector: practice
    - Operators: +, -, cross and dot: practice
  - Line
    - Setting a line
    - Interchangeable with vectors: start, end, direction and magnitude: practice
  - Frame (Plane)
    - Components: point & vectors
- Curve
  - Curve as equation: \( x^2 + y^2 = 1 \)
  - Curve as function: \( x = \cos(a), y = \sin(a) \): parametrical(kinematic) description
  - Trace of point in space at certain time interval
  - Curve parameter(t) vs length factor(L): practice
  - Bezier: parametric curve / linear interpolation: de Casteljau's algorithm / degree: practice
    - \( y = x^2 \) and \( x = f(t), y = g(t) \) - differently expressed. In Rhino, curves are parameterized.
- Types of curves
  - Linear spline: polyline
  - Cardinal spline: interpolated curve: practice
  - Bezier span / Hermite interpolation (handle vs points): practice
  - NURBS (Non Uniform Rational B Spline): weight - 4d point: practice
- Curve parameter
  - Tangent (unit slope vector): practice: 1st derivative
  - Curvature: function of 1st and 2nd derivatives
    - Total curvature
    - Average curvature
    - Curvature
    - Curvature circle / osculating plane: practice
    - Positive / Negative / Inflection
- Normal (unit curvature vector)
- Binormal: cross product of T & N
- Rotation along binormal - curvature / rotation along tangent - torsion
- Continuity: \( G0(position), G1(tangent), G2(curvature) \) / evaluating: curvature graph: practice
- Curve property
  - Parametric description: \((u, v)\) domain
  - Always have 4 sides - trim?
  - Iso curves: graphical representation of any possible curves on the surface
  - Vectors: Normal, u & v, tangent plane
  - Normal section
  - Curvature
    - Principal, Average, Gaussian: practice
  - Types of surface: flat, ruled, synclastic, anticlastic, revolving: practice
  - Creating surface: loft, rail, rail, revolve, network, patch, drape: practice
  - Continuity: \( G0(position), G1(tangent), G2(curvature) \) / evaluating - zebra: practice
- Surface
- Polygon: Mesh: practice