Texturing

- How to apply textures to surfaces
  - Texture coordinates
  - Texture lookup – know the typical scenario
  - Importance of perspectively correct interpolation
    - When linear interpolation in screen space is/can be good enough?
- Procedural texture
  - Know how it works; know how to implement a simple procedural texture (e.g. a checkerboard) in GLSL
- Sampled textures
  - Know standard interpolation techniques (nearest neighbor, bilinear)
  - Know how to use sampled textures in GLSL
- Examples of applications
  - Mirror surfaces
  - Carving from a 3D block using 3D textures

Data structures for meshes

- Triangle soup
- Triangle table + vertex table
  - Know how to construct from triangle soup
- Adjacency table
  - Know how to construct from triangle table
- Planar subdivisions
  - Half-edge data structure
    - Know how to use (e.g. implement local queries efficiently)
    - Also works for polygonal surfaces

Polynomial curves/patches

- Bezier curves
  - deCasteljau algorithm
  - Formula
    - basis functions
    - weighted average of control points
  - Properties
    - Convex hull
    - Tangents at endpoints
    - Degree vs number of control points
    - No local control
  - Joining Bezier curves
  - Subdivision for Bezier curves
    - Know how it works
    - Know how to use it to approximate a Bezier curve
- B-splines
  - Construction based on averaging
  - Basis functions
    - Know how to compute them (formula not required)
    - Support size and local control
    - Weighted average of control points
  - Basic properties
    - Local control
    - Smoothness (d-1 continuous derivatives for degree d)
    - Piecewise polynomial of degree d
  - Subdivision for B-splines
    - Know how it works
    - How to use it to approximate B-spline curves
- Patches
  - Bezier patches
    - How to define (array of control points)
    - How to compute parametrization formula using the Bezier curve formula
    - How to triangulate
  - B-spline patches
    - How to define

Subdivision curves/surfaces

- 4-point rule
  - Interpolating curve
  - Know the formula and how to apply it to approximate the curve
- Loop subdivision
  - Know how to subdivide; e.g. What is the result of subdividing a tetrahedron once?
  - Approximating (limit surface does not pass through original vertices)
- Butterfly subdivision
  - Know how it works
  - Interpolating (limit surface passes through original vertices)