Computer Graphics (main subject)

Introductory topics: Information Technology, Computer Graphics and Geometry.

- Color sense, color matching, color schemes, color mapping, materials, spectral image synthesis, material models, textures
- 2D image synthesis, vectorization, transformations, 2D cut. Incorporating algorithms, including point, polyhedron collision, cutting
- Geometric processing algorithms. triangulation, curve approximation by polygons, approximation of surfaces
- Ray casting. Simplified illumination. Reflection and fracture directions. Recursive raytracking. Radius and surface intersection. Acceleration possibilities for intersection calculation.
- 3D incremental image synthesis. Graphical pipeline. View transformation. Cutting. Occlusion. Shading. Alias reduction: pre-filtering, post filtering. Texture mapping. Texture filtering. Bump and environment mapping. Shadows. GPUs
- Physical laws of realistic motion. Description and interpolation of position and orientation. Motion curves. Keyframe, and track animations. Physical animations: rigid and non-rigid bodies, collision. Forward and inverse kinematics.
- Geometric modells: meshes, spherical and volumentric models. CSG, geometric primitives, classifications, B-rep, geometric topology.
- Bézier curves, de Casteljau algorithm, Bernstein basis. Properties of Bézier curves. Algorithms for Bezier curves: degree incrementation, arc division.
- Non-uniform B-splines. Interpolation and its properties. Modelling algorithms for C^1 quaratic, C^2 cubic, and C^1 cubic curves.
- Representation of conoids. Rational Bézier and B-spline (NURBS) curves.
- Parametric rectengular surfaces: Ferguson, Hermite, Bézier, B-spline patchesm Coons interpolation-
- Subdivision curves and surfaces. Doo-Sabin, Catmull-Clark algorithms.
- Implicit and parametric curves and surfaces. Intersection of surfaces.

Irodalom:

- Farin, G., *Curves and Surfaces for CAGD. A Practical Guide*, 5th ed., Morgan Kaufmann (2002)
- Foley, J. D., van Dam, A., Feiner, S. K., Hughes, J. F., *Fundamentals of Computer Graphics*, 2nd ed., Addison-Wesley (1995)
- Hoffmann, C. M., *Geometric and Solid Modeling: An Introduction,* 2nd. ed., Morgan Kaufmann (1992)
- Szirmay-Kalos László, *Számítógépes grafika,* ComputerBooks (2000)
- Szirmay-Kalos László, *Háromdimenziós grafika, animáció és képszintézis,* ComputerBooks (2003)