I. COURSE DESCRIPTION FROM CATALOG: Mathematical methods for graphics and modeling. Topics such as: 3-D transformations, ray tracing, rendering, image processing, and compression. Lec. 3. Cr. 3.

II. PREREQUISITE(S): Consent of Instructor (previous coursework involving proofs and some programming experience are needed)

III. COURSE OBJECTIVE(S): To provide a mathematical introduction into various areas of computer graphics and modeling, such as 3-D transformations and 3-D object descriptions, computational solid geometry, and modern rendering techniques, such as ray tracing and radiosity.

IV. TOPICS TO BE COVERED:

Chapter 1 Subdivision: Functions as Fractals
  1.1 Functions
     1.1.1 Piecewise Polynomials
     1.1.2 Bezier Curves
  1.2 Fractals
     1.2.1 Iterated Affine Transformations
     1.2.2 The Sierpinski Triangle
     1.2.3 The Koch Snowflake
     1.2.4 Bezier Curves
  1.3 Subdivision
     1.3.1 Piecewise Linear Splines
     1.3.2 Subdivision for Piecewise Linear Splines

Chapter 2 A Integral Approach to Uniform Subdivision
  2.1 A Subdivision Scheme for B-Splines
     2.1.1 B-Spline Basis Functions via Repeated Integration
     2.1.2 A Refinement Relation for B-Spline Basis Functions
     2.1.3 The Associated Subdivision Scheme
  2.2 A Subdivision Scheme for Box Splines
     2.2.1 B-Spline Basis Functions as Cross-sectional Volumes
     2.2.2 Box-spline Scaling Functions as Cross-sectional Volumes
     2.2.3 Subdivision for Box Splines
     2.2.4 Examples
  2.3 B-splines and Box Splines as Piecewise Polynomials
     2.3.1 B-splines as combinations of Truncated Powers
     2.3.2 Box Splines as Combinations of Cone Splines
     2.3.3 Bivariate Examples

Chapter 4 A Differential Approach to Uniform Subdivision
  4.1 Subdivision for B-splines
     4.1.1 A Differential Equation for B-splines
     4.1.2 A Finite Difference Equation for B-splines
     4.1.3 The Associated Subdivision Scheme
  4.2 Subdivision for Box Splines

Students with a disability requiring accommodations should contact the Office of Disability Services (ODS). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The ODS is located in the Roaden University Center, Room 112; phone 372-6119.
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V. ADDITIONAL INFORMATION:
This course may be cross-listed as CSC 6460. Please ask departmental secretary to enter it as a cross-listed course in TTUMIS.

VI. POSSIBLE TEXTS AND REFERENCES:

VII. ANY TECHNOLOGY THAT MAY BE USED: