CSC 474 – Computer Animation

1. CSC 474 – Computer Animation

2. credit units 4  contact hours  6

3. Course Coordinator: Christian Eckhardt

4. Textbook (or other required material):
   Computer Animation Algorithms and Techniques by Parent, Morgan Kaufman

5. a. Course Description
   Basic and advanced algorithms for generating sequences of synthetic images. Interpolation in
time and space, procedural and keyframe animation, particle systems, dynamics and inverse
kinematics, morphing and video. 3 lectures, 1 laboratory.

   b. Prerequisite: CSC/CPE 471.

   c. Required/Elective/Selective Elective for CPE, CSC, EE, SE

       |               | CSC | CPE | SE |
       |---------------|-----|-----|----|
       | Required      |     |     |    |
       | Elective      | X   | X   | X  |
       | Selective Elective |     |     |    |

6. a. Course Learning Objectives
   The student will be able to:
   • Explain parametric as well as recursive subdivision algorithms for curve,
     respectively path generation.
   • Explain linear, bilinear and trilinear interpolation in time and space and
     interpolation animation for three dimensional objects.
   • Create, compare, contrast and explain procedural and keyframe animation with a
     state-of-the-art motion capturing device.
   • Explain the physics of particles, particle system and rigid body’s kinematics in
     computer animation.
   • Create programs using basic and advanced algorithms for computer animation.
   • Create and manage a bigger programming project utilizing skills and techniques
     learned in computer animation.
   • Evaluate the quality of the results of these techniques.

   b. Level at which Student Outcomes are addressed
   (“B” = Basic level, “I” = Intermediate level, “A” = Advanced level)

       | 1  | 2  | 3  | 4  | 5  | 6  | 7  |
       |----|----|----|----|----|----|----|
       | CSC| A  | I  | B  | B  | A  | N/A|
       | SE/CPE | A | I | B | B | A |
7. **Major Topics Covered: (number of lecture hours per)**

- Introduction to animation concepts (1.5 hours)
- Human visual system (1.5 hours)
- Classical animation (1.5 hours)
- Interpolation and curves
  - Linear, quadratic, cubic (1.5 hours)
  - Bezier, parabolic, Catmull-Rom, Hermite (1.5 hours)
  - Curves in time and space (1.5 hours)
  - Distance control on curves (3 hours)
- Procedural motion and keyframing (1.5 hours)
- Spatial and temporal antialiasing (1.5 hours)
- Particle systems
  - Forces, acceleration and velocity (1.5 hours)
  - Euler solution for particle systems (1.5 hours)
- Dynamics and inverse kinematics (2.5 hours)
- Character animation (3 hours)
- Quaternions (1.5 hours)
- Skinned meshes (1.5 hours)
- Principles of animation (artistic considerations) (1.0 hour)