Application for New Course

1. Submitted by the College of Engineering  
   Department/Division offering the course: Computer Science  
   Date: August 1, 2000

2. Proposed designation and Bulletin description of this course:  
   (a) Prefix & Number: CS 633  
   (b) Full Title: 3D Computer Animation  
      Abbreviated Title (≤ 24 characters): 3D Computer Animation  
   (c) Lecture/Discussion hours per week: 3  
   (d) Laboratory hours per week: 0  
   (e) Studio hours per week: 0  
   (f) Credits: 3  
   (g) Course description:  
      This course covers the underlying principles and techniques of 3D computer animation. The topics covered include (1) modeling: the process of building the forms that will be animated, (2) rendering; the process of defining how the final picture in the model will look, (3) animation techniques: the process of creating in-between frames and keyframes, (4) compositing and special effects: the process of assembling various pieces of an image to get special two-dimensional effects, and (5) recording: the principles and techniques involved in putting animation frames onto film or video.

   (h) Prerequisites (if any): Prerequisites: CS 335 or CS 535, or consent of instructor.
   (i) May be repeated to a maximum of: Not applicable

4. To be cross listed as: Not applicable
   Signature of cross-listing chair: ________________________________

5. Effective date: Fall 2001

6. Course to be offered:  
   Fall  
   Spring  
   Summer  
   X

7. Will the course be offered annually; explain if not: Yes

8. Why is the course needed? Computer-generated animation is not only changing what we normally think of as animation, but also changing the face of live-action films. Special effects can be generated and fit seamlessly into live-action films now. A course in this area would provides the students with an opportunity to learn the underlying principles and techniques of computer animation which are in great demand now.

9. (a) By whom will the course be taught? Fuhua (Frank) Cheng
   (b) Are facilities for teaching this course now available? Yes
      If not, what plans have been made for providing them?

   FEB 14 2001
10. What enrollment may reasonably be expected? 15

11. Will this course serve students in the Department primarily? Yes
Will it be of service to a significant number of students outside the Department? No
If yes, under what area?

12. Check the category most applicable to this course:
   ___ traditional; offered in corresponding departments elsewhere;
   ___X relatively new, now being widely established;
   ___ not yet found in many (or any) other universities

13. Is this course part of a new proposed program? No
If yes, which?

14. Will adding this course change the degree requirements in any programs? No
If yes, explain:

15. Attach a list of the major teaching objectives of the proposed course and outline
and/or a reference list to be used: See attached

16. If the course is a 100-200 level course, please submit evidence (e.g., correspondence)
that the Community College System has been consulted.
   not applicable

17. Within the Department, who should be contacted for further information about the
proposed course?
   Name: Fuhua (Frank) Cheng  Phone: 257-6760

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1Approval of this course will constitute approval of the program change unless other program modifications are proposed.
Signatures of Approval:

Department Chair: ____________________________ Date: 11/19/03

Dean of the College: __________________________ Date: 2/8/01

Date of Notice to the Faculty: ________________

Undergraduate Council²: ______________________ Date: ______

University Studies²: ________________________ Date: ______

Graduate Council²: __________________________ Date: 8/27/01

Senate Council²: ____________________________ Date: ______

Date of Notice to the University Senate: ________

Action other than approval: ______________________

²If applicable, as provided by the Rules of the University Senate
Needed Skills
The students should be capable of programming in C, C++ or Java, and have a general understanding of 3D graphics, data structures, and numerical computing.

Learning Outcomes
The students will know how to specifying the storyboard, the object definition, and the key frames in the setting up of a computer animation sequence. The students will also understand the complexities and subtleties of 3D computer animation. Most importantly, the students will be able to produce their own 3D computer animations.

Topics
- Modeling: polygon modeling, splines and patches, geometric primitives, transformations, modeling techniques, hierarchies, Boolean operations and trims, digitizing techniques, plant generators
- Rendering: lights, surface characteristics, rendering algorithms, texture mapping, atmospheric effects, final-frame considerations
- Animation Techniques: keyframing simple transformations, interpolations, parameter-curve editing, morphing, hierarchical animation, inverse kinematics, motion paths, shape changes, camera animation, animation lights and surface properties
- Advanced Animation Techniques: fractals, motion dynamics, motion capture and channel animation, metaballs, particle and particle-like systems, procedural animation
- Compositing & Special Effects: digital techniques, video editing
- Recording: video, film

Examinations
Exact details about examinations in this course will be determined by the instructor offering the course. Typically there will be two in-class examinations during the semester and a two-hour final examination. Specific details will be made available in the syllabus at the start of each semester in which the course is offered.

Grading
A student's grade will be determined by a weighted average of homework assignments, programming exercises, projects, midterm examinations, and the final examination. The faculty offering the course will make the details available at the start of the course.
A typical weighting is:

Homework and programs: 40%
Midterm Examinations (2 @ 15%): 30%
Final Examination: 30%