

Proposal For A New Non-General Education Course:

Introduction to Computer Animation

1. Details

- a. **Course Title:** Introduction to Computer Animation
- b. **Sponsor:** Adrian Rusu, Computer Science Department, Rowan University.
- c. **Semester hours:** 3
- d. **Course Level:** Undergraduate, [Junior/Senior]. General Education designation is not sought.
- e. **Prerequisites:** (Linear Algebra (1701.210) or Math for Engineering Analysis II (1701.236)) and Physics with Calculus I (1902.200).
- f. **Suggested Time and Scale of Implementation:** This course is to be offered every other year, or based on demand.

2. Curricular Effect

The proposed course will become available as “restricted elective” for computer science majors and minors. A Computer Animation course will increase the number and variety of those electives making Computer Science curriculum more attractive to prospective and current students. This course will examine the field of Computer Animation, exposing students to existing and developing computer animation algorithms and techniques.

- **Offerings:** No class will be dropped as a result of this course.
- **Adequacy of Resources:** The current computers & software available in the open labs and computer science advanced lab are adequate to carry out this course at the present time. However it is fully expected that the equipment will need to be regularly upgraded to support this course, as well as all of the courses in our major. Thus it is, of course, necessary that a reasonable replacement cycle be maintained.
- **Recommended Library Resources:** Current library resources are adequate.
- **Short-term Evaluation:** This course has not been offered previously.

3. Rationale

Computer animation is one of the most rapidly expanding areas of creative endeavor and technical development. Computer-generated sequences in feature films and television, digital special effects in feature films, computer-animated simulator rides, computer games and virtual environments are some of the more visible applications of 3D computer animation.

The expansion of the market and the application areas of computer animation are predicted to have an explosive growth for many years to come. Well-qualified professionals in this area are, and will, in the foreseeable future, continue to be in great demand internationally and command substantial rewards.

Over the past ten years both the technology and the creative application of this technology have reached such a level of maturity and sophistication that a number of quite distinct and specialized application areas are emerging. Such areas are **computer animation, digital special effects, and computer games.**

The proposed course will strengthen the department's current offering of advanced restricted electives. Currently, computer science department offers one related course: 0707.360 Computer Graphics. While Computer Graphics covers some basic animation, a Computer Animation course will go into much more detail on how advanced animation is created.

4. Essence of the Course

a. **Objectives in Relation to Student Outcomes:** Upon completion of this course, students will be able to:

- explain and apply the basics of keyframing and interpolation
- apply models of motion based on Newtonian Physics to animation
- describe and compare models of group behavior and apply them to animation
- apply techniques for animating articulated figures
- explain the basic principles of motion capture and apply them to an animation application
- implement and document a large software project related to computer animation

b. **Topical Outline/Content:**

- Keyframing / Interpolation
- Rigid Body Dynamics
- Articulated Figure Motion
 - Forward Kinematics
 - Inverse Kinematics
 - Walking
 - Motion Capture
- Group Behavior
 - Flocking
 - Particle Systems
- Basics of character animation
- Facial Animation
- Animation and Sound
- Automatic Camera Control
- Animated Lighting

- Animation of Natural Phenomenon (Fire, Smoke, Plants)
 - Animating surfaces
 - Soft objects
 - Cloth Animation
 - Hair and Fur
- c. Evaluation of students and grading procedure:** Students will be evaluated by traditional methods such as homework and projects assignments, quizzes, presentations, and exams.
- d. Course Evaluation:** This course will be evaluated through student surveys, as well as by the Computer Science Accreditation Commission when our major is to be re-evaluated in 2006.

5. Consultations

- a. Management & M.I.S.
- b. Electrical & Computer Engineering
- c. Mathematics
- d. Physics

6. Catalog Description

0707.380 (Suggested hegis number)

3 s.h.

Introduction to Computer Animation

(Prerequisites: (1701.210 or 1701.236) and 1902.200)

This is a junior/senior level course that takes a look at Computer Animation from a programmer's perspective. It will investigate the theory, algorithms, and techniques for describing and programming motion for virtual 3D worlds. Approaches that will be explored include keyframing systems, kinematics, motion of articulated figures, and procedural and behavioral systems. This course includes the implementation of techniques presented in lecture. Students are encouraged to devise new techniques, implement them, and determine their effectiveness. Students will be required to implement and document a large software project related to computer animation.