

PROCESS A

MAY 13 2005

CURRICULUM PROPOSAL

SCC #04-05

J. S. J.

Deadlines: February 11, 2005 to be implemented Spring 2005

PROPOSAL TITLE: COMPUTER ANIMATION

Sponsor: ADRIAN RUSC, E-Mail: ADRIAN.RUSC@RWJUNIVERSITY.NJ, Ext: 1349

DEPARTMENT: COMPUTER SCIENCE

COLLEGE: LIBERAL ARTS AND SCIENCES

If Liberal Arts & Sciences CHECK: History/Humanities, Math/Sciences, Social/Behavioral Sciences, UNDERGRADUATE, GRADUATE

THE ATTACHED NON-GEN-ED PROPOSAL IS BEST DESCRIBED BY THE ITEM(S) CHECKED

- Checkboxes for: New non-gen-ed course, Minor curricular changes, Existing non-gen-ed course, Non-gen-ed degree requirements, Major, Minor, specialization, concentration, track, certificate program

THE FOLLOWING SIGNATURES REPRESENT APPROVAL

Department Chair, Department Curriculum Chair, Academic Dean with signatures and dates (2/3/05)

COLLEGE CURRICULUM COMMITTEE

OPEN HEARING Date, Approved/Not Approved, COLLEGE CURR. COUNCIL CHAIR, Senate Curriculum Chair Signature, Date Senate Announcement

EXECUTIVE VICE PRESIDENT/PROVOST Signature, Date (6/21/05)

Approved/Not Approved checkboxes

REGISTRAR, Date (6/28/05), Registrar Signature, Notification Forward

CC: SCC Chair, Academic Dean, Department Chair, Registrar, IR, OAR, VP Student Affairs, Others

Handwritten notes: 1/6/05, DB 7/6/05 MW

## Proposal For A New Non-General Education Course:

### Introduction to Computer Animation

#### 1. Details

- (see new proposal back in)*
- 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 fundamentals 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
- specify, design, 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
- Advanced character animation
  - Use of genetic algorithms
  - Procedural Gesturing
  - Levels of Control

- 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 is a programming-oriented course with major deliverables including the implementation of techniques presented in lecture as well as a final project concentrating on an area of a student's choice.

Rowan University  
**CURRICULUM PROPOSAL  
 LIBRARY RESOURCE FORM**

The purpose of this form is to provide a channel of communication between the library and faculty changing and designing new courses/programs. The information will be used to assess the resources available in the library, and to identify resources the library should acquire to support the course/program. The information will also provide rationale for institutional support for library acquisitions. This form should be completed in a coordinated effort between the course sponsor(s) and the academic department liaison librarian. **THIS FORM MUST BE COMPLETED FOR ALL CURRICULUM PROPOSALS.**

- The sponsor(s) complete parts A & B. If assistance is required to complete parts A & B, please notify the liaison librarian.
- Forward this form to the librarian who will complete parts C, D & E.

***This form must be completed and attached to the original curriculum proposal before being approved by the Senate Curriculum Committee***

A. College LIBERAL ARTS AND SCIENCES Department: COMPUTER SCIENCE  
 Proposed by: ADRIAN RUSC Date: 04/18/05  
 Course Title: INTRODUCTION TO COMPUTER ANIMATION  
 Anticipated Date for Course/Program Offering: FALL 2006

B. List specific resources that should be acquired to support this course.

*None*

C. Describe the resources available in the library to support this course/program, including reference, monographic, electronic databases, audio-visual materials, etc. A summary statement is sufficient.

*ART of 3D Computer Animation and Effects - 2nd Edition, by Isaac Kellard  
 Physics for game developers, by David Bourg*

D. List key periodicals available in the library to support this course/program.

E. Librarian comments and recommendations

Name of LIBRARIAN LIAISON Johanna Muller Librarian Signature Johanna Muller

**From:** "Daniel J. McFarland" <mcfarland@rowan.edu>  
**To:** <mcfarland@rowan.edu>, <rusu@rowan.edu>  
**Date:** 1/11/05 3:28PM  
**Subject:** Re: Course Proposals Consultations

Hi Adrian,

Thank you for asking for submitting your proposals for our review. The MIS Faculty support the following new course proposals as written:

1. Computer Animation (Graduate)
2. Computer Animation (Undergraduate)
3. Information Visualization (Graduate)
4. Information Visualization (Undergraduate)

Dan.

Daniel J. McFarland, Ph.D.  
Associate Professor, MIS  
Rowan University  
201 Mullica Hill Road  
Glassboro, NJ 08028  
Tel. 856.256.5426 Fax 856.256.4439  
>>> "Adrian Rusu" <rusu@rowan.edu> 01/11/05 14:35 PM >>>  
Dear Dan,

I have finally found time to put together four new course proposals in my area (two undergraduate and two graduate). Please send me your comments on these proposals. Thank you very much.

Best Wishes in the New Year!  
Adrian

Adrian Rusu, Ph.D.  
Assistant Professor  
Department of Computer Science  
Rowan University  
201 Mullica Hill Road  
Glassboro, NJ 08028-1701  
Phone: 856-256-4500 x3884  
Email: rusu@rowan.edu  
HTTP: <http://elvis.rowan.edu/~rusu>



*Electrical and Computer Engineering*

January 30, 2005

Professor Adrian Rusu  
Computer Science Department  
Rowan University  
Glassboro, NJ 08028

Re: Computer Animation (Graduate and Undergraduate)

Dear Professor Rusu:

The Electrical & Computer Engineering department has received your course proposal entitled "Computer Animation" (Graduate and Undergraduate levels). We have reviewed the rationale, curricular effect and proposed course content and are pleased to support this course offering.

However, we request that "...or Math for Engineering Analysis II" be added to the course pre-requisites to allow ECE Graduate students and Seniors to take this course. The ECE department has active ongoing research projects (and MS theses) in the area of Virtual Reality and Modeling – and we believe that allowing this option will be mutually beneficial for both the course offering and the ECE students with related research topics who may potentially enroll in it.

Best wishes,

Shreekanth Mandayam, Ph.D.  
Associate Professor  
ECE Curriculum Committee Chair

Cc: Dr. Jennifer Kay, Chair, CS



*Department of Physics and Astronomy*

**Date:** January 31, 2005

**To:** Dr. Adrian Rusu, Computer Science

**From:** Jeff Hettinger, Chair, Physics and Astronomy  
(x4397)

**Re:** *Computer Animation* course proposals


Our department has reviewed the “Computer Animation” course proposal as well as the proposal for the similar graduate course. We support the proposals and the addition of the courses. We are pleased that these will be available to science majors outside the computer science program. The plan for evaluation by the Computer Science Accreditation Commission strengthens the proposal.

If students taking this course desire to learn higher level mechanics appropriate for the coordinate transformations required in game software, we encourage the Computer Science Department to advise students to consider taking Analytical Mechanics (1902325). We also hope that introducing this course may eventually lead to an interdisciplinary course that allows students from the Art program to participate.



*Mathematics Department*

**TO:** Adrian Rusu

**FROM:** Ronald J. Czochor, Chairman  
Mathematics Dept. 

**DATE:** February 8, 2005

**RE:** Consultation on Proposal for new courses entitled *Computer Animation* and *Information Visualization* (both graduate and undergraduate versions)

Thank you for the opportunity to comment on the new courses you are proposing. All four courses require Linear Algebra as a prerequisite and the Mathematics Department is in total agreement with this prerequisite. Since all Computer Science majors take Linear Algebra this should not cause any additional burden for our department. We assume that you would hope to attract engineering students to this course as well. If that is the case you might also consider Mathematics for Engineering Analysis I as an alternative prerequisite since engineering students get their exposure to linear algebra in this course and do not routinely take Linear Algebra.

Since you are proposing both courses as graduate courses as well, we might consider allowing our graduate student's to take the *Information Visualization* course as part of their program, but would need to see if there is any difference in the expectations for graduate students in the class. Both proposals are identical and this does not clearly delineate any differences between the courses if it in fact exists.

Overall, we support these courses as valuable additions to the curriculum at Rowan University.

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- Basics of character animation
- Facial Animation
- Animation and Sound
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