Course Change Proposal
Form A

<table>
<thead>
<tr>
<th>Academic Group (College): engineering &amp; computer science</th>
<th>Academic Organization (Department): computer science</th>
<th>Date: 10/30/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Course Proposal:</td>
<td>Department Chair: Dr. Du Zhang</td>
<td>Submitted by: John Clevenger</td>
</tr>
<tr>
<td>New X Change ___ Deletion ___</td>
<td></td>
<td>Semester Effective: Fall ___ Spring X_, 2010</td>
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<tr>
<td>Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes ___ No X_</td>
<td>For Catalog Copy: Yes X_ No ___</td>
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<td>CCE (Extension): Yes ___ No X_</td>
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This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number): N/A

If changing an existing course, should new version be considered a repeat of the original version? If so, the same Course ID will be maintained. If not, a new Course ID will be assigned. Note: In PeopleSoft terminology, the Course ID is the unique system identifier, not the Catalog Nbr. N/A

Yes ___ No ___

<table>
<thead>
<tr>
<th>Change from:</th>
<th></th>
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<tbody>
<tr>
<td>Subject Area (prefix) &amp; Catalog Nbr (course no.): N/A</td>
<td>Title: N/A</td>
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<tr>
<td>Change to:</td>
<td>Units: N/A</td>
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<tr>
<td>Subject Area (prefix) &amp; Catalog Nbr (course no.): CSC 127</td>
<td>Title: 3D Computer Animation</td>
</tr>
<tr>
<td>Units: 3</td>
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JUSTIFICATION:
Computer gaming is rapidly becoming an important offering in computer science curricula across the country. Our Computer Science department currently offers a number of electives which allow students to gain expertise in various aspects of computer games (e.g., CSc 155 – Advanced Computer Graphics, CSc 165 – Computer Game Architecture, and CSc 180 – Intelligent Systems). However, most of the current electives are highly technical in nature. A broad understanding of the field of computer games also requires that students have the opportunity to obtain skills, techniques, and appreciation for other important facets of computer game development. Among these are an understanding of the tools and methods used to create computer models within games, and experience with the various methods and tools used for animation. Students are provided with an opportunity to learn about computer modeling through CSc 126 – 3D Computer Modeling (cross-listed as Art 142). However, CSc126/Art142 does not have time to cover the important animation concepts which are necessary to gain a solid understanding of the field of game development. The proposed course will provide students with an opportunity to learn about the animation methods and techniques which are the basis for nearly all the dynamic interaction which occurs in computer games, and for which currently no such course exists on our campus.

NEW COURSE DESCRIPTION: (Not to exceed 80 words, and language should conform to catalog copy. See http://www.csus.edu/umanual/acad.htm - Guidelines for Catalog Course Description
Creative skills and techniques for animating 3D computer-modeled objects/environments. Topics include animation techniques; keyframing and interpolation; deformation and morphing; path control; skeletal animation; model rigging and skinning; forward- and inverse-kinematics, constraints and IK solvers; particle systems; fluid, cloth, hair, and fur simulation; shape keys; and soft body animation. Emphasis on both skill development and creative application of modeling and animation techniques. Includes demos, in-class and homework exercises, and self-directed projects.

Note:
Prerequisite: CSc 126 or Art 142
Enforced at Registration: Yes X No
Corequisite: None
Enforced at Registration: Yes No
Graded: Letter _X_  Credit/No Credit__  Instructor Approval Required? Yes__ No_X__
Course Classification (e.g., lecture, lab, seminar, discussion): Lab
Title for CMS (not more than 30 characters)  3D Computer Animation
Cross Listed? Yes_X_  No____ If yes, do they meet together and fulfill the same requirement, and what is the other course.
      Yes; Yes: Art 143 – 3D Computer Animation
How Many Times Can This Course be Taken for Credit? _2_
Can the course be taken for Credit more than once during the same term? Yes__ No_X__

FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:

Description of the Expected Learning Outcomes: Describe outcomes using the following format: “Students will be able to: 1), 2), etc.” See the example at http://www.csus.edu/acaf/example.htm

After completing this course, students will be able to:
1. Create 3D animations that demonstrate the application of a range of 3D computer animation techniques;
2. Use 3D animation techniques to creatively explore movement, gravity, volume, space and time;
3. Use problem-solving skills to work through technical problems in the animation process;
4. Use the 3D modeling tool to create hierarchical 3D models;
5. Apply materials and textures to 3D models;
6. Create 3D scenes and environments including camera and light positioning;
7. Discuss the creative uses of 3D computer animation and virtual reality within contemporary culture and new media art;
8. Participate in critiques with peers;
9. Participate in creating an effective classroom environment, including helping others.

**Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.

Assessment Strategies: A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

Group critiques
Homework and in-class exercises
Short animation projects
Final animation project

For whom is this course being developed?
Majors in the Dept _X_  Majors of other Deps _X_  Minors in the Dept __  General Education ____  Other ____
Is this course required in a degree program (major, minor, graduate degree, certificate? Yes__ No_X__
If yes, identify program(s):

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes__ No_X__
If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). None

The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.
**Approvals:** If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

<table>
<thead>
<tr>
<th>Signatures:</th>
<th>Date</th>
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<tbody>
<tr>
<td>Department Chair:</td>
<td>11/3/2009</td>
</tr>
<tr>
<td>College Dean or Associate Dean:</td>
<td>11/16/09</td>
</tr>
<tr>
<td>CPSP (for school personnel courses ONLY)</td>
<td></td>
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<tr>
<td>Associate Vice President</td>
<td></td>
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<tr>
<td>and Dean for Academic Programs</td>
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Distribution: Academic Affairs (original), Department Chair and College Dean. Dean's office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.

9/10/2008
New Course Proposal:  CSc 127 – 3D Computer Animation
Submitted by John Clevenger, CSc Dept.
October 31, 2009

Catalog description

Creative skills and techniques for animating 3D computer-modeled objects/environments. Topics include animation techniques; keyframing and interpolation; deformation and morphing; path control; skeletal animation; model rigging and skinning; forward- and inverse-kinematics, constraints and IK solvers; particle systems; fluid, cloth, hair, and fur simulation; shape keys; and soft body animation. Emphasis on both skill development and creative application of modeling and animation techniques. Includes demos, in-class and homework exercises, and self-directed projects. Prerequisite: CSc 126 or Art 142.

Textbook

The Essential Blender: Guide to 3D Creation with the Open Source Suite Blender, Roland Hess (Editor), Blender Foundation, 2007

References

Animating with Blender: How to Create Short Animations from Start to Finish, Roland Hess, Focal Press, 2008
Introducing Character Animation with Blender, Tony Mullen, Wiley Press, 2007

Course Goals

After completing this course, students will be able to:

1. Create 3D animations that demonstrate the application of a range of 3D computer animation techniques;
2. Use 3D animation techniques to creatively explore movement, gravity, volume, space and time;
3. Use problem-solving skills to work through technical problems in the animation process;
4. Use the 3D modeling tool to create hierarchical 3D models;
5. Apply materials and textures to 3D models;
6. Create 3D scenes and environments including camera and light positioning;
7. Discuss the creative uses of 3D computer animation and virtual reality within contemporary culture and new media art;
8. Participate in critiques with peers;
9. Participate in creating an effective classroom environment, including helping others.
Prerequisites by Topic

*Thorough understanding of:*
- Use of a 3D modeling tool to create hierarchical 3D models
- Application of materials and textures to 3D models
- Creation of a 3D scene environment including camera and light positioning

*Basic understanding of:*
- Aesthetics of scene composition and lighting in a 3D scene

Major Topics Covered in the Course

1. Modeling for animation (3 hours)
2. Animation tool user interfaces (3)
3. Keyframing, action sequencing and non-linear action composition (6)
4. Modeling, rigging, and skinning (3)
5. Skeletal animation systems (6)
6. Interpolators and timelines (3)
7. Camera and animation paths (3)
8. Using IK solvers in animation (3)
9. Deformation and morphing (3)
10. Fluid and cloth simulation (3)
11. Particle systems; hair and fur simulation (3)
12. Soft body creation, deformation and animation (3)
13. 3D computer animation art and artists (3)

Course Outcomes

*Thorough understanding of:*
- Keyframe animation using both linear and non-linear interpolators
- Camera and animation path control
- Skeletal animation techniques and procedures
- 3D model rigging and skinning
- Use of an IK solver for creating animation sequences
- Action sequencing and non-linear action composition

*Basic understanding of:*
- Motion blur
- Walk/motion cycles
- Facial animation
- Types of deformation and use of a tool to generate deformation sequences
- Animation techniques for simulation of fluids, cloth, hair, and fur
- Use of particle systems for animation sequences
Exposure to:
- Animation techniques including anticipation, timing, follow-through and overlap, in-and-out spacing, emphasis
- Forward- and inverse-kinematics

Course Projects
1. Use lattices to deform a simple 3D object
2. Animate a camera moving along a path
3. Develop a set of keyframes to animate a simple 3D object
4. Apply a non-linear interpolator to a keyframe set
5. Create and skin a 3D model
6. Use a skeletal animation tool to rig and animate a 3D model
7. Use an IK solver to animate a 3D model
8. Use an animation tool to create a simple fluid or cloth simulation
9. Use a particle system tool to create a hair or fur simulation
10. Create a set of facial animations using a morphing tool
11. Propose and implement an instructor-approved independent animation project

Estimated Curriculum Category Content (Semester hours)

<table>
<thead>
<tr>
<th>Area</th>
<th>Core</th>
<th>Advanced</th>
<th>Area</th>
<th>Core</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithms</td>
<td>0.0</td>
<td></td>
<td>Data Structures</td>
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<tr>
<td>Software Design</td>
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<td>Prog. Languages</td>
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<tr>
<td>Comp. Arch.</td>
<td>0.0</td>
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Oral and Written Communications
Students will be required to present oral reports on their animation projects, and to give oral critiques of other projects

Social and Ethical Issues
No significant component.

Theoretical Content
No significant component.

Problem Analysis
No significant component.

Solution Design
Students will be required to propose, develop, and present animation sequences for a variety of animation problems, including a significant course semester project.