

Introduction to Computer-Aided Animation CGS 3034, Credits 3

Prerequisite: Precalculus - Algebra and Trigonometry MAC 1147 or equivalent

Instructor: Brent Rossen

Course Webpage: <http://www.cise.ufl.edu/~brossen/cgs3034.php>

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Justification for Course:

CGS 3034 introduces undergraduates, especially those within the Digital Arts and Sciences degree programs, to applied computer graphics topics for non-real-time rendered media. The course will not be limited to DAS students and can be taken by anyone who meets the prerequisite course requirement. The interdisciplinary nature of this course stresses the application of computer science and engineering to creative disciplines.

Catalog Course Description:

Introduction to topics relating to computer-aided animation. Rigging for forward and inverse kinematics. Skin weighting. Morph targets. Expression-driven animation, rigid-body and particle simulation.

Goal of Course:

Introduce students to topics in applied computer graphics, specifically in computer aided animation. Present standard animation techniques, forward and inverse kinematics, morph targets, expression-driven animation, rigid-body and particle simulation.

Course Content Overview:

1. Regular multimedia-enhanced lectures in a CIRCA-equipped classroom
2. Peer critique and Socratic seminars to discuss relevant works
3. Multimedia demonstrations (VHS, DVD, Internet)

Required Text:

Book: John Edgar Park, *Understanding 3D Animation Using Maya (With CD)*, Springer Science+Business Media, Inc. 2005. ISBN 0-387-00176

Recommended Text:

Book: Alias, *The Art of Maya: An Introduction to 3D Computer Graphics*, Sybex, 2005. ISBN 1894893824

Required Software:

Maya Unlimited (currently 6.0). Available in UF computer labs, students do not need to purchase. The course book includes a CD with Maya Personal Learning Edition 6.

Makeup Policy:

Late submissions will be penalized by 10% per day. This is specifically to accommodate miscalculations of rendering time. Please plan final renderings for one to two days in advance.

Make-ups are permitted only in the following circumstances: religious holidays, student illness or medical impairment, absence subject to the twelve-day rule, examination conflicts, or legal impairment. In these circumstances the student should notify the instructor as soon as they are aware of a potential exam or deadline conflict so that an alternative may be established.

Grading:

- 1. Projects.....50%
- 2. Participation.....10%
- 4. Midterm Exam.....10%
- 5. Final Exam.....10%
- 6. Final Project.....20%

Lecture Topics:

- 1. Basic 3-D Concepts: Cartesian Coordinate System, Pivots, Transformations, Scene Graph, Coordinate Spaces (World, Object, Local)
- 2. Introduction to types of animation: path, keyframe, nonlinear.
- 3. Animation curves: reading, editing, manipulation of tangents to control easing.
- 4. Mesh set-up for rigging. Default bind pose. Skinning.
- 5. Forward kinematics rigging. Joint hierarchies.
- 6. Lattice deformation.
- 7. Inverse kinematics rigging. Effectors. Locators. Gimbal Lock.
- 8. Expressions.
- 9. Morph targets and blend shapes.
- 10. Particle systems and point masses. Emitters, forces, and constraints.
- 11. Rigid-body dynamics. Active and passive bodies. Resistance and moments. Stand-ins.

Projects:

- 1. Keyframe Animation
- 2. Animated Camera and Repeated Animation
- 3. Depth of Field Camera, Easing, Tangents, and Gobo Lighting
- 4. Animation Hierarchies, Transform Order, Bump Maps
- 5. Motion Paths, Driven Keys, Added Attributes, Skeletons, Character Setup and Rigging, Camera Cuts, MEL Shelf Buttons
- 6. IK Animation, Skin Weighting, 3d Painting, Optical Effects
- 7. Final Project – Putting it all together – Design, Modeling, Animation, Shading, Lighting, Rendering