

Course proposal: Maya Dynamics and Special Visual Effects
Academic level: Junior/Senior
Credit hours: 4 (2 three hour lab/lecture sessions per week for ten weeks)
Target market:

Art, Theatre students needing science credits
Science students interested in dynamical systems simulation and computer graphics
Super bright High School students

Prerequisites

Introduction to Computer Simulation and Visualization, Calculus III or better, Introduction to Physics, Programming III, Art 352, 353 or 354 are all recommended, or permission of Instructor.

Course content:

(fifty words for the ECP catalog):

Dynamics is a branch of physics describing motion and other changes to real world objects. Students will explore Maya's system of tools for simulating object behavior based on realistic physics computations, and produce rendered animations of special effects like smoke, fire, particle systems, force fields, spring system kinematics and turbulence.

Emphasis for Art students is on developing at least one well crafted project to yield animations that can be used for the student's demo reel when applying to special effects houses such as Pixar, Disney or Industrial Light and Magic. Smoke or particles following an invisible path can be used to materialize the letters of a logo or the student's name. Objects can be guided by force fields such as wind or gravity to simulate planetary orbits or autumn leaves blown by the wind. The class lab projects will implement such systems.

For Science students, emphasis will be on producing a system with realistic mathematical model of the pertinent Physics, such as cloud formation by orographic uplift, ocean circulation, or the circumpolar vortex Rossby waves. These examples are, of course, very advanced. Complete system simulation is not required, but it is expected of the student that an accurate system design and model will be developed.

Once developed, a student's dynamical system will be animated and rendered using Maya to produce a Quicktime or other format movie. Consequently, some aspects of rendering, lighting and animation will be reviewed as needed to bring all students up to an adequate level to produce the desired quality of final product. As time permits, students will tune their systems for better visual results and, if necessary, rendering and animation performance.

The computer science aspect of this class is in design and planning of a complex software project, and the systematic, intentional experimentation with nonlinear dynamical systems to achieve an *a priori* goal, such as the animated logo letters created by realistic movement of smoke trails. Students will develop familiarity with physics in a complex and realistic environment, whether their project is three body gravitationally determined orbits, objects blowing in the wind, or explosions, fires or flowing lava.

Maya Embedded Language (MEL) is a scripting language used for controlling virtually every aspect of Maya. As needed, MEL will be used in conjunction with interactive tools to fine tune the behavior of the dynamical systems.

<< offline: maybe I'm being too ambitious with the class projects. They sound quite advanced even to me. My goal is to exercise the various features of Maya Dynamics, and give the student the *ability* to implement such goals, given adequate time. I think there could be an advanced course beyond this one for the *big project*. >>