CIS 694 (682): Introduction to Computer Animation

* Rick Parent

**Description**
Introduction to the basic algorithms and techniques used in producing computer animation including interpolation, particle systems, flocking, physically based simulation, inverse kinematics, and facial animation.

**Level and Credits**
UG 4 (three one-hour lectures, heavy programming)

**Prerequisites**
* CIS 681

**Quarters Offered**
* Au

**General Information, Exclusions, etc.**
* None

**Objectives**
* Mastery of basic techniques to interpolate the movement of objects
* Familiarity with physically based animation, energy minimization, and constraint-based animation.
* Exposure to algorithms to animate the human figure and natural phenomena such as plants, clouds, and fire

**Text**

**Grading Plan**
* presentations - 20%
* midterm - 20%
* final - 20%
* final project - 40%
Topics

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, overview and history of computer animation; relation to conventional animation, overview of digital video; introduction to software</td>
<td>Ch. 1 App. B</td>
</tr>
<tr>
<td>2</td>
<td>Background - display pipeline, quaternion math, curve formulations, rendering issues for animation</td>
<td>Ch. 2, App. A</td>
</tr>
<tr>
<td>3</td>
<td>Interpolation, arclength parameterization, ease-in/ease-out control</td>
<td>Ch. 3</td>
</tr>
<tr>
<td>4</td>
<td>Deformable models, animation languages, plug-ins</td>
<td>Ch. 3</td>
</tr>
<tr>
<td>5</td>
<td>forward and inverse kinematics; introduction to physically based animation</td>
<td>Ch. 4</td>
</tr>
<tr>
<td>6</td>
<td>Collision detection and response</td>
<td>Ch. 4</td>
</tr>
<tr>
<td>7</td>
<td>physically based animation</td>
<td>Ch. 4</td>
</tr>
<tr>
<td>8</td>
<td>constraint-based animation</td>
<td>Ch. 4</td>
</tr>
<tr>
<td>9</td>
<td>modeling and animating natural phenomena</td>
<td>Ch. 5</td>
</tr>
<tr>
<td>10</td>
<td>modeling and animating the human figure</td>
<td>Ch. 6</td>
</tr>
</tbody>
</table>

Projects

* Group projects - 2 or more students, mixing ART students with CIS students when possible,
* Project groups are required to keep a web page with storyboard and status of the project including still images and test animations as they are generated,
* for each group, 4 oral progress reports made by the entire group to the class during the quarter:

Project progress reports

* week 2 - proposed storyboard
* week 4 - final storyboard, sample still images
* week 6 - timing of sequences, sample stills, sample low-res animation
* week 8 - sample final high-res animation, storage and time requirements of project
* finals week - final presentation of animation to class

Exams

* week 5 - midterm
* week 10 - final