COURSE OUTLINE

Course Number  DMA 224  
Course Title  Rigging for Animation & Games  
Credits  3  

Hours:  
1/4  
Implementation:  
Fall 2012  

Catalog description (2006-2009 Catalog): 
Character rigging and design techniques for gaming, broadcast and feature film industries. Topics include node-based hierarchies, forward and inverse kinematics, constraints, user interfaces, skinning, and melscripting. Utilizing both PC and Mac computers with professional digital content creation software, students design and construct armatures for different object types.

Pre-requisite  
DMA 120  

Co-requisite  
DMA 225  

Is course New, Revised, or Modified?  
New  

Required texts/other materials:  None

Revision date:  
11/20/12  

Course coordinator:  Ric Giantisco, x3458, giantisr@mccc.edu  

Information resources:  (Describe the primary information resources that support the course, including books, videos, journals, electronic databases, websites, etc. To request new materials for your course, use the library request form at: www.mccc.edu/student_library_course_form.shtml)

Other learning resources:  (Describe any other student learning resources that are specific to this course, including any special tutoring or study group support, learning system software, etc.)
Course Competencies/Goals:

The student will be able to:

1. Design, organize and present efficient node-based hierarchies using Autodesk Maya. (GE Goal 1, 4, MCCC CS Goals A, B, D, E)
2. Demonstrate conceptual and working knowledge of Forward and Inverse Kinematics through classroom discussion, timed in-class exercises, project assignments and use of appropriate technical terminology in articulating these concepts. (GE Goal 4, 6, MCCC CS Goals A, B, D, E)
3. Distinguish between Point, Orient, Parent and Pole Vector constraints and apply their respective attributes to facilitate effective character skeletons. (GE Goal 1, 4, MCCC CS Goals A, B, D, E)
4. Create mathematical functions and equations through MelScripting to streamline production and enhance accessibility. (GE Goal 1, 2, 4, MCCC CS Goals A, B, D, E)
5. Bind deformable mesh objects to node-based hierarchies and balance their statistical skin weight values for animation. (GE Goal 2, 4, 8, MCCC CS Goals B, D, E)
6. Develop, organize and present object-oriented control systems to enable character expressions, articulation and deformation. (GE Goal 1, 4, MCCC CS Goals A, B, D, E)

General Education Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Goal 5. Social Science. Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
Goal 6. Humanities. Students will analyze works in the fields of art, music, or theater; literature; philosophy and/or religious studies; and/or will gain competence in the use of a foreign language.
Goal 7. History. Students will understand historical events and movements in World, Western, non-Western or American societies and assess their subsequent significance.
Goal 8. Diversity. Students will understand the importance of a global perspective and culturally diverse peoples.

MCCC Core Skills

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
Goal C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.
Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.
Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.
Goal G. Intra-Cultural and Inter-Cultural Responsibility. Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

Units of study
Unit I - Basic Hierarchies & Tools

The student will be able to…

1. Demonstrate knowledge of a node’s order of operations. (CG 1)
2. Solve hierarchal problems using the Hypergraph. (CG 1)
3. Build and organize hierarchies with the Outliner. (CG 1)
4. Outline and present classic examples of biped character hierarchies. (CG 1)
5. Utilize and create group nodes to organize function capability. (CG 1)
Unit 2 - Skeletons

The student will be able to...

1. Reorient joints and define numerical limits to enable correct chain movement and rotation. (CG 1 & 3)
2. Draw and affix nodes to form skeletal hierarchies. (CG 1, 2, 6)
3. Write and develop efficient naming conventions. (CG 1)
4. Design proper joint chains using Forward Kinematics. (CG 1, 2, 6)
5. Devise effective joint chains using Inverse Kinematics. (CG 1, 2, 6)
6. Create and setup new object attributes. (CG 1 & 6)
7. Layout and define hierarchies for gaming, broadcast and cinematic projects. (CG 1)
8. Compose MelScript code to generate complex mathematical functions and automation. (CG 1 & 4)
9. Construct a basic quadruped skeleton. (CG 1, 2, 3, 4, 5, 6)

Unit 3 - Constraints & Set Driven Keys

The student will be able to...

1. Differentiate and select constraint options to achieve specific results. (CG 3)
2. Apply appropriate constraints to seamlessly blend with existing hierarchies. (CG 1 & 3)
3. Balance and manipulate statistical weight attributes to enable proper animation. (CG 1 & 5)
4. Link NURBs curve controllers to existing skeletal joints using constraints. (CG 1 & 6)
5. Engineer a skeletal hand hierarchy using Set Driven Keys. (CG 1 & 6)
6. Plan and compose a Facial Rig IU with Set Driven Keys. (CG 1, 4, 6)

Unit 4 - Skinning

The student will be able to...

1. Paint skin weights on a bound mesh object using Additive and Subtractive methods. (CG 1 & 5)
2. Copy skin weight maps from one character to another. (CG 1, 5, 6)
3. Choose and affect specific skinning techniques to facilitate smooth deformation. (CG 5)
4. Employ the Component Editor to balance numerical weight values to control joint influence. (CG 5)
5. Add new joints into an existing skin. (CG 1 & 5)

Evaluation of student learning:

Achievement of the course objectives will be evaluated through the use of the following tools:

- Weekly mini projects that evaluate student knowledge and skill of specific techniques, mechanisms and/or armatures through written presentations, digital content creation and discussion. (CG 1, 2, 3, 4, 5, 6)
- Four software, technique, and terminology quizzes. (CG 1, 2, 3, 4, 5, 6)
- Five three-week projects using Autodesk Maya: (CG 1, 2, 3, 5, 6)
  1. Reverse Foot. (CG 1, 2, 3, 6)
  2. Arm IK/FK Switch with Finger Controls. (CG 1, 2, 3, 4, 6)
  3. Biped Character. (CG 1, 2, 3, 4, 5, 6)
  4. Face Rig & Interface. (CG 1, 3, 6)
  5. Quadruped Character. (CG 1, 2, 3, 4, 5, 6)
Project Values/Grade Breakdown

<table>
<thead>
<tr>
<th>The final grade is based on the following values:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Mini Projects</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Attendance &amp; Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Three Week Projects</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Students with Disabilities

Any student in this class who has special needs because of a disability is entitled to receive accommodations. Eligible students at Mercer County Community College are assured services under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973.

If you believe you are eligible for services, please contact Arlene Stinson, the Director of Academic Support Services. Ms. Stinson’s office is LB221, and she can be reached at (609) 570-3525.

Academic Integrity

As per the student handbook, “A student will be guilty of violating academic integrity if he/she (a) knowingly represents the work of others as his/her own, (b) uses or obtains unauthorized assistance in the execution of academic work, or (c) gives fraudulent assistance to another student.” Students should read the Academic Integrity policy in the MCCC Rights and Responsibilities Student Handbook. Academic Dishonesty will result in failure of this course.

Equal Opportunity Policy

Mercer County Community College is committed to equal opportunity and affirmative action. Discrimination on the basis of race, creed, color, national origin, ancestry, age, gender, affectional or sexual orientation, marital status, familial status, liability for service in the Armed Forces of the United States, nationality, political views, religion, disability unrelated to job or program requirements or any other characteristic protected by law is prohibited.

Questions regarding the equal opportunity policy and compliance statement may be directed to the Affirmative Action Officer, West Windsor Campus, (609) 586-4800, ext. 3270.