Butler Community College
Business, Technology and Workforce Development

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COURSE OUTLINE
3D Computer Animation I

Course Description:
BA128. 3D Computer Animation I. 3 Credit Hours. This course will enable to student to gain an understanding of the basics of 3D computer modeling and animation. Through the use of exercises, projects, discussions, and examples, the student will learn how to use the tools of a 3D modeling and animation software package, learning how to create and animate objects and scenes from scratch.

Course Relevance:
As computer generated images continue to grow in popularity and marketability, the demand for these skills grows as well. The principles learned in this course will allow the student to effectively design and present computer generated models and animations. The principles are relevant to anyone wishing to explore art via 3D modeling, whether it is creating cartoon-like animations or photo-realistic images.

Required Materials:
Ablan, D. (2006). *Inside Lightwave 9*. Boston: New Riders Publishing.

Learning Outcomes: The intention is for the student to be able to:
1. Discuss the concepts of three dimensional modeling on a flat screen
2. Build three dimensional objects via use of primitives and modifications
3. Create scenes with appropriate camera, lighting, and keyframing techniques
4. Render finished animations

Primary Learning PACT Skills that will be DEVELOPED and/or documented in this course:
Through the student involvement in this course, he/she will develop his/her ability in the following primary PACT skill areas:
1. Field Related Technology
   - Through the production of animation projects using 3d modeling and animation software and plugins, the student will demonstrate the ability to create computer generated models and animations.
2. Problem Solving
   - Through assignments and exercises, the student will demonstrate the ability to solve problems by finding and correctly using the appropriate software tools to achieve the desired geometry in their models.
3. Time Management
   - By completing projects on time and satisfying the assignment objectives, the student will demonstrate the ability to plan their work, submit proposals and storyboards, and then stay on task through the processes of modeling, animating, and rendering.

Secondary skills (developed but not documented):

Computer Literacy
Aesthetic Response
Internet Use

Major Summative Assessment Task(s):

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. Creating a final project in which the student creates models and scenes from scratch, and renders a final animation demonstrating proficiency at the skills learned throughout the semester.

Course Content:

I. Themes – Key recurring concepts that run throughout this course:
   A. Design
   B. Aesthetics
   C. 3D terminology
II. Issues – Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
   A. Understanding how real world issues such as lighting and shadows are created in a computer generated world
   B. Using the technology to create effects that match the story, rather than just "because I can"
III. Concepts – Key concepts that must be understood to address the issues:
   A. Relating to the visual response of the audience
   B. Brevity in the modeling and animation steps to achieve desired results
IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
   A. Provide critical analysis of the modeling and animation work of others
   B. Create models using appropriate tools with the 3d modeling toolset
   C. Create animations using appropriate techniques

Learning Units:

I. Concepts of three-dimensional modeling on a flat screen
   A. Elements of three-dimensional modeling
   B. Plotting points on XYZ coordinates
   C. Basic modeling and animation terminology.

II. Navigating Modeler's screen
   A. Loading and saving objects
   B. Moving objects between Modeler and Layout
   C. View orientation
   D. Zoom
   E. Autofit
   F. Layers
   G. Copy and paste
   H. Undo and redo

I. Default measurement units
J. Shortcut keys

III. Building three-dimensional objects
A. Primitives tools
B. Drawing tools
C. Selecting and deselecting polygons
D. Sizing
E. Flipping polygons
F. Surface color

IV. Modifying basic objects
A. Selecting and deselecting
B. Moving
C. Subdividing
D. Rotating
E. Stretching
F. Mirror

V. Molding objects
A. Knife
B. Shear
C. Twist
D. Taper
E. Bend
F. Magnet controls
G. Merging points

VI. Adding geometry
A. Clone objects
B. Bevel
C. Extrude
D. Smooth shift
E. Morph

VII. Adding and subtracting parts
A. Drill
B. Slice
C. Boolean

VIII. MetaNURBS
A. Freezing MetaNURBS
B. Saving MetaNURBS

IX. Layout Navigation
A. Scene editor

B. Graph editor
C. Loading objects and scenes
D. Different views of objects

X. Object Manipulation
A. Move
B. Rotate
C. Size and stretch
D. Parenting
E. Adding bones
F. Editing bones
G. Resizing polygons

XI. Surfacing
A. Loading and saving
B. Surface colors
C. Surface textures
D. Luminosity
E. Transparency
F. Opacity
G. Smooth textures
H. Refraction
I. Fractal noise
J. Surface presets

XII. Lighting techniques
A. Different lighting types
B. Light intensity, color, and falloff
C. Positioning lights
D. Lens flares
E. Shadows
F. Light envelopes

XII. Motion paths
A. Keyframes
B. Playing previews
C. Inverse kinematics
D. Hierarchical keys
E. Motion envelopes

XIV. Special effects
A. Plug-ins
B. Backdrops

XV. Rendering Animation
A. Camera resolutions

B. Frame rendering
C. Rendering animation
D. Codecs
E. Playing AVI files

Learning Activities:
Independent and collaborative learning activities will be assigned within and outside the classroom to assist the student to achieve the intended learning outcomes. Those activities will include class discussions, reading assignments, book exercises, and modeling and animation projects.

Grade Determination:
Grades will be based on successful completion of assessment tasks, learning activities and active class participation.