Florida Department of Education
Student Performance Standards

Course Title: 3-D Animation Technology 1
Course Number: 8718110
Course Credit: 1

Course Description:

This course focuses on the history of 3-D animation, production process, intellectual property rights, computer skills and animation development.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
04.0 Understand the history of 3D Animation--The student will be able to:		
04.01 Understand the history of animation (2D, cell, stop motion).		
04.02 Understand the history of computer animation.		
04.03 Identify the advantages and limitations of computer animation.		
04.04 Identify industry and business use of 3D animation.		
04.05 Identify 3D assets and associated end products.		
05.0 Understand the production process–The student will be able to:		
05.01 Identify the job titles associated with animation production.		
05.02 Identify various tools and equipment used to produce 3D animation.		
05.03 Understand speed and efficiency concepts		
05.04 Understand a production pipeline.		
05.05 Identify the departments of an animation studio.		
05.06 Understand the interrelationships between departments.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
05.07 Understand basic communication concepts (verbal, memos, paperwork).		
05.08 Identify the stages of production.		
05.09 Understand studio terms and jargon.		
05.10 Create and organize production paperwork into production bibles or prepare for presentations.		
06.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets–The student will be able to:		
06.01 Understand the limits and expectations of copyright protection.		
06.02 Understand the use of "Fair use and Fair Dealing".		
06.03 Understand the transfer and licensing of creative works.		
06.04 Understand the use of "exclusive rights" to intellectual creations.		
06.05 Demonstrate the use of digital watermarking.		
07.0 Demonstrate proficiency in computer skills--The student will be able to:		SC.912.P.10.15; SC.912.P.10.18
07.01 Identify all computer parts.		
07.02 Demonstrate understanding of computer performance specifications.		
07.03 Compare and contrast difference between business machines and workstations.		
07.04 Demonstrate best practices of computer safety and ergonomics.		
07.05 Demonstrate understanding of operating systems.		
07.06 Perform software installation and setup.		
07.07 Perform peripheral device installation and setup.		
07.08 Perform computer upgrades. (memory/hard disk/cards)		
07.09 Perform storage management operations (project/file).		
07.10 Demonstrate knowledge of computer maintenance.		
07.11 Demonstrate ability to troubleshoot computer hardware and software issues.		
08.0 Demonstrate knowledge of photo editing software--The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
08.01 Demonstrate understanding file formats and storage options.		
08.02 Identify parts of the software interface. (menus/palettes)		
08.03 Demonstrate ability to use each of the basic tool sets.		
08.04 Demonstrate ability to import, export and save images.		
08.05 Demonstrate understanding of layers and channels.		
08.06 Demonstrate understanding of filters, effects and plug-ins.		
08.07 Demonstrate understanding of file presets.		
08.08 Demonstrate ability to select portions of an image for manipulation.		
08.09 Demonstrate ability to transforms selections and images. (crop, scale)		
08.10 Demonstrate ability to color correct images (brightness, hue, contrast)		
08.11 Demonstrate ability to use brushes for image creation and correction.		
08.12 Understand non-destructive and destructive operations.		
08.13 Demonstrate the ability to import, paint and export 3D objects		
08.14 Demonstrate the basic use of video in Photoshop		
09.0 Demonstrate a knowledge of production writing as it relates to 3D animation--The student will be able to:		
09.01 Understand the job of a scriptwriter.		
09.02 Identify target audiences, markets, and demographics.		
09.03 Identify the elements of a script.		
09.04 Develop the intended message of a script.		
09.05 Demonstrate ability to write a treatment.		
09.06 Demonstrate ability to write a professionally formatted script.		
09.07 Identify the genre of a story.		
09.08 Define characters and setting for a story.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
09.09 Demonstrate ability to breakdown a script into production elements (cast, props).		
10.0 Demonstrate knowledge of art direction--The student will be able to:		
10.01 Develop the overall visual appearance of an animation.		
10.02 Demonstrate the ability to create moods with style.		
10.03 Determine the geographic location and time period of the story.		
10.04 Understand the importance of art direction as it pertains to the message.		
10.05 Understand the use of color in art direction.		
10.06 Document the technical aspects of the art direction for use in production.		
10.07 Perform the various assignments in a professional manner according to industry standards.		
11.0 Demonstrate knowledge of character development--The student will be able to:		
11.01 Demonstrate and understanding of character profiles.		
11.02 Demonstrate the ability to develop character resumes/profiles.		
11.03 Develop a look and design of a character that reflects the art direction.		
11.04 Understand the technical challenges/limitations of a character.		
12.0 Demonstrate knowledge of storyboarding--The student will be able to:		
12.01 Demonstrate understanding of visual storytelling and how storyboards are used during production.		
12.02 Identify common aspect ratios and how to calculate ratios.		
12.03 Demonstrate understanding of camera framing and camera movement.		
12.04 Develop a visual style using the art direction.		
12.05 Break down a script into the various camera shots and character action.		
12.06 Demonstrate understanding of perspective and depth of field.		
12.07 Demonstrate knowledge of lighting and color use.		
12.08 Demonstrate ability to sketch a storyboard including characters.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
12.09　Demonstrate ability to use storyboarding software or illustration software.		
13.0　Demonstrate knowledge of animatics--The student will be able to:		
13.01　Demonstrate understanding of animatics and how they are used during production.		
13.02　Identify the different types of animatics.		
13.03　Demonstrate understanding of shot timing.		
13.04　Break down a script into the various camera shots and character action.		
13.05　Understand the concept of a working print.		
14.0　Demonstrate knowledge of video editing software--The student will be able to:		
14.01　Demonstrate understanding file formats and storage options.		
14.02　Identify parts of the software interface. (menus/palettes)		
14.03　Demonstrate ability to use each of the basic tool sets.		
14.04　Demonstrate ability to import, export and save video.		
14.05　Demonstrate understanding of layers and compositing.		
14.06　Demonstrate understanding of filters, effects and plug-ins.		
14.07　Demonstrate understanding of file presets.		
14.08　Demonstrate understanding of rendering process.		
14.09　Demonstrate ability to transform video (crop, scale).		
14.10　Demonstrate ability to color correct images (brightness, hue, contrast)		
14.11　Demonstrate ability to use brushes for image creation and correction.		
14.12　Understand non-destructive and destructive operations.		
14.13　Demonstrate the compositing integration of rendered 3D animation with video.		
15.0　Demonstrate appropriate voice acting skills--The student will be able to:		
15.01　Demonstrate an understanding of how to mark a script for voice over.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
15.02 Demonstrate the ability to read aloud in a professional manner.		
15.03 Demonstrate the ability to receive and properly act upon direction.		
15.04 Demonstrate an understanding of the use of phonemes and facial morphs for lip-sync animation.		
15.05 Understand the concept of voice acting and playing a role while speaking.		
15.06 Perform the various assignments in a professional manner according to industry standards.		
16.0 Demonstrate basic audio production--The student will be able to:		
16.01 Demonstrate to set up a recording environment.		
16.02 Demonstrate understanding of digital audio recording hardware.		
16.03 Demonstrate understanding of the proper use of microphones.		
16.04 Demonstrate knowledge of audio codecs and media.		
16.05 Understand the history of Foley and sound effects production.		
16.06 Demonstrate the ability to record location sounds.		
17.0 Demonstrate knowledge of audio editing software--The student will be able to:		
17.01 Demonstrate understanding file formats and storage options.		
17.02 Identify parts of the software interface. (menus/palettes)		
17.03 Demonstrate ability to use each of the basic tool sets.		
17.04 Demonstrate ability to import, export and save audio.		
17.05 Demonstrate understanding of multiple tracks.		
17.06 Demonstrate understanding of filters, effects and plug-ins.		
17.07 Demonstrate understanding of file presets.		
17.08 Demonstrate understanding of audio rendering process.		
17.09 Demonstrate ability to edit, cut, and delete.		
17.10 Understand non-destructive and destructive operations.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
18.0 Demonstrate knowledge of funding presentations and pitches--The student will be able to:		
18.01 Understand the ecosystem associated with product distribution.		
18.02 Identify the job titles and roles of the distributors.		
18.03 Identify potential markets, target audiences, and products.		
18.04 Develop the materials needed to effectively convey the message.		
18.05 Develop a script of talking points.		
18.06 Effectively communicate a message or pitch.		

Florida Department of Education
Student Performance Standards

Course Title: **3-D Animation Technology 2**
Course Number: **8718120**
Course Credit: **1**

Course Description:

This course focuses on animation modeling.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
19.0 Understand modeling in relation to the production process--The student will be able to:		
19.01 Define modeling as a process.		
19.02 Define the role of modeler.		
19.03 Identify job titles associated with modeler.		
19.04 Identify modeling in the production pipeline.		
20.0 Demonstrate knowledge of animation principles as it relates to modeling--The student will be able to:		
20.01 Demonstrate an understanding of the principle - squash and stretch.		
20.02 Demonstrate an understanding of the principle - anticipation.		
20.03 Demonstrate an understanding of the principle - staging.		
20.04 Demonstrate an understanding of the principle - straight ahead action and pose to pose.		
20.05 Demonstrate an understanding of the principle - follow through and overlapping action.		
20.06 Demonstrate an understanding of the principle - slow in and slow out.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
20.07 Demonstrate an understanding of the principle - arcs.		
20.08 Demonstrate an understanding of the principle - secondary action.		
20.09 Demonstrate an understanding of the principle - timing.		
20.10 Demonstrate an understanding of the principle - exaggeration.		
20.11 Demonstrate an understanding of the principle - solid drawing.		
20.12 Demonstrate an understanding of the principle - appeal.		
21.0 Demonstrate knowledge of modeling principles--The student will be able to:		
21.01 Understand 3D construction theory.		
21.02 Demonstrate understanding of primitives, parametric modeling.		
21.03 Demonstrate an understanding of NURBS, splines, and polygonal modeling.		
21.04 Demonstrate ability to use reference images and files while modeling.		
22.0 Demonstrate knowledge of 3D Animation Software--The student will be able to:		
22.01 Identify the computer requirements for 3D animation software.		
22.02 Compare and contrast available 3D animation software.		
22.03 Identify available file formats and protocols.		
22.04 Demonstrate an understanding of naming conventions.		
22.05 Develop software and file backup plan.		
22.06 Identify common icons within the software.		
22.07 Demonstrate use of keyboard shortcuts.		
22.08 Understand the use of a three-button mouse.		
23.0 Demonstrate knowledge of 3D Animation software navigation--The student will be able to:		
23.01 Identify the main windows of a 3D program.		
23.02 Identify common window layouts.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
23.03 Identify tool icons within the software.		
23.04 Understand the significance of keyboard shortcut use and efficiency.		
23.05 Demonstrate use of keyboard shortcuts.		
23.06 Demonstrate an understanding of the Euclidean Geometry Model (x-y-z- coordinate system).		
23.07 Demonstrate an understanding of attribute managers.		
23.08 Demonstrate an understanding of layers.		
23.09 Navigate the modeling window using pan, rotate, and zoom controls.		
23.10 Demonstrate knowledge of selection tools (lasso, loop).		
23.11 View objects in wireframe, gourard shading, lines, boxes modes.		
23.12 Demonstrate use of selection sets.		
23.13 Undo and redo an action within the program.		
23.14 Locate the help menu system.		
24.0 Demonstrate knowledge of NURBS modeling--The student will be able to:		
24.01 Demonstrate an understanding of points, vertices, edges, and polygons.		
24.02 Demonstrate an understanding of poly-count.		
24.03 Demonstrate an understanding of primitives.		
24.04 Define parametric primitives.		
24.05 Locate an object's properties, attributes, and coordinates.		
24.06 Demonstrate understanding of Non uniform rational b-splines (NURBS).		
24.07 Demonstrate understanding of splines and generators (extrude, lathe, sweep).		
24.08 Understand the use of hierarchy.		
24.09 Demonstrate an understanding of Boolean objects.		
24.10 Demonstrate an understanding of Null objects.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
24.11 Demonstrate an understanding of scene management (hiding and un-hiding).		
24.12 Demonstrate an understanding of arrays.		
25.0 Demonstrate knowledge of polygon modeling--The student will be able to:		
25.01 Demonstrate an understanding of N-gons.		
25.02 Demonstrate an understanding of subdivision.		
25.03 Demonstrate basic polygon editing and manipulation.		
25.04 Demonstrate knowledge of point management (location).		
25.05 Demonstrate the ability to create polygonal models from points.		
25.06 Demonstrate an understanding of cutting/division tools.		
25.07 Demonstrate an understanding of extrudes.		
25.08 Demonstrate an understanding of symmetry.		
25.09 Demonstrate an understanding of hyper NURBS.		
25.10 Demonstrate an understanding of basic deformers (bend, twist, melt).		

Florida Department of Education
Student Performance Standards

Course Title: 3-D Animation Technology 3
Course Number: 8718130
Course Credit: 1

Course Description:

This course focuses on rendering 3-D animation.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
29.0 Demonstrate knowledge of basic lighting--The student will be able to:		SC.912.P.10.18; SC.912.P.10.20
29.01 Compare and contrast real lighting with 3D lighting.		
29.02 Demonstrate an understanding 3 point lighting (key, fill, back).		
29.03 Demonstrate an understanding of low key and high key lighting.		
29.04 Use 'include/exclude' commands to target light on objects.		
29.05 Demonstrate use of negative intensity.		
29.06 Demonstrate an understanding of the hierarchy of lights.		
29.07 Demonstrate an understanding of area lights.		
29.08 Demonstrate an understanding of volumetric lights.		
29.09 Demonstrate an understanding of radiosity/global illumination.		
29.10 Demonstrate an understanding of ambient occlusion.		
29.11 Demonstrate an understanding of HDRI lighting.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
29.12 Demonstrate an understanding of how light settings will effect render times.		
30.0 Demonstrate knowledge of basic materials and textures--The student will be able to:		SC.912.P.8.1; SC.912.P.8.2; SC.912.P.10.18; SC.912.P.10.20
30.01 Demonstrate an understanding of material and texture storage.		
30.02 Apply textures to an object.		
30.03 Demonstrate an understanding of procedural shaders.		
30.04 Demonstrate an understanding of channels.		
30.05 Adjust the transparency, luminance, and reflection of a material.		
30.06 Demonstrate an understanding of displacement maps.		
30.07 Demonstrate an understanding of bump maps.		
30.08 Demonstrate knowledge of material projections.		
30.09 Demonstrate an understanding of UV mapping.		
30.10 Demonstrate an understanding of 3D painting.		
30.11 Understand how light affects the look of materials.		
30.12 Understand how camera angles can affect the look of materials.		
31.0 Demonstrate knowledge of basic animation--The student will be able to:	MAFS.912.S-IC.2	SC.912.N.3.5; SC.912.N.1.4
31.01 Apply animation principles to object animation.		
31.02 Demonstrate an understanding of animation timelines.		
31.03 Demonstrate an understanding of key framing.		
31.04 Demonstrate an understanding of F-curves.		
31.05 Record and edit key frames.		
31.06 Demonstrate an understanding in the use of controllers.		
31.07 Demonstrate an understanding of ease in, ease out.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
31.08 Demonstrate an understanding of camera animation.		
31.09 Render low quality reference animation.		
32.0 Demonstrate knowledge of basic character setup--The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19
32.01 Compare and contrast rigging approaches and styles.		
32.02 Demonstrate an understanding of the rig as it relates to the model.		
32.03 Demonstrate an understanding of mesh morphing (targets, driver, driven).		
32.04 Demonstrate an understanding of skeletal systems.		
32.05 Demonstrate an understanding of bones or joints.		
32.06 Demonstrate an understanding of bone/joint hierarchies and naming conventions.		
32.07 Demonstrate an understanding of controllers.		
32.08 Demonstrate an understanding of IK (Inverse Kinetics) splines.		
32.09 Demonstrate an understanding of IK (Inverse Kinetics) chains.		
32.10 Demonstrate an understanding of skins and weights.		
32.11 Demonstrate ability to create a visual selector for the rig.		
33.0 Demonstrate knowledge of basic 3D rendering–The student will be able to:		SC.912.P.10.18; SC.912.P.10.20
33.01 Demonstrate an understanding of processor, hardware and software rendering techniques.		
33.02 Determine the final render format (size, codec, quality).		
33.03 Demonstrate an understanding of basic render settings.		
33.04 Demonstrate an understanding of title safe, action safe, render safe.		
33.05 Select the range of frames to be rendered.		
33.06 Demonstrate an understanding of global illumination (radiosity) render settings.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
33.07 Demonstrate an understanding of anti-aliasing.		
33.08 Demonstrate an understanding of net rendering.		
33.09 Demonstrate an understanding of alpha channels.		
33.10 Render animation as a movie or image sequence.		
33.11 Compile image sequence into a movie.		
33.12 Demonstrate an understanding of benefits, purpose and workflow of multi-pass rendering.		
33.13 Demonstrate an understanding of the batch render process.		

Florida Department of Education
Student Performance Standards

Course Title: **3-D Animation Technology 4**
Course Number: **8718140**
Course Credit: **1**

Course Description:

This course focuses on advanced animation and theory.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
34.0 Understand the role of texture artist in relation to the production process--The student will be able to:		SC.912.P.10.18; SC.912.P.10.20; SC.912.P.8.1; SC.912.P.8.2
34.01 Define texturing as a process.		
34.02 Define the role of texture artist.		
34.03 Identify job titles associated with texture artist.		
34.04 Identify texture creation in the production pipeline.		
34.05 Demonstrate knowledge of the difference between textures and shaders.		
34.06 Demonstrate an understanding of texture projection methods.		
34.07 Demonstrate an understanding on UV coordinates and their application to texture mapping.		
34.08 Demonstrate an understanding of the round-trip integration of Photoshop and a 3D host for texture development.		
34.09 Demonstrate an understanding of how to link texture and shade properties to object movement via either visual or scripted programming relationships.		
35.0 Demonstrate knowledge color theory--The student will be able to:		SC.912.P.10.18; SC.912.P.10.20

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
35.01 Demonstrate an understanding of additive and subtractive color mixtures.		
35.02 Demonstrate an understanding of hue, saturation and brightness.		
35.03 Demonstrate an understanding of complimentary colors and composition.		
35.04 Identify warm and cool colors.		
35.05 Demonstrate an understanding of the psychology of color influence.		
36.0 Demonstrate knowledge of advanced material and texture creation--The student will be able to:		SC.912.P.10.18; SC.912.P.10.20; SC.912.P.8.1; SC.912.P.8.2
36.01 Determine required materials and textures needed for a model based on production design sheets and reference images.		
36.02 Determine material and texture properties to be created.		
36.03 Determine appropriate style (realistic, hyper-real, simplified)		
36.04 Determine appropriate color pallets to be used based on art direction.		
36.05 Determine appropriate image resolution and file format for use in 3D application.		
36.06 Demonstrate knowledge of material and texture creation techniques and approaches.		
36.07 Define the tools and software used to create materials and textures.		
36.08 Acquire raw texture images from digital stills or scans.		
36.09 Create tiled textures using photo-editing software.		
36.10 Demonstrate a true working understanding of the correspondent relationship between UV polys and their related polygons.		
37.0 Demonstrate knowledge of cloth and hair--The student will be able to:		SC.912.N.1.4; SC.912.N.3.5; SC.912.P.8.2; SC.912.P.10.18; SC.912.P.10.20
37.01 Determine cloth or hair requirements based on production design sheets and reference images.		
37.02 Define physical properties associated with cloth and hair.		
37.03 Demonstrate knowledge of hair and cloth toolsets.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
37.04 Determine appropriate materials to be use with the hair.		
37.05 Demonstrate knowledge of hair manipulation and management.		
37.06 Demonstrate knowledge of hair and cloth lighting techniques.		
37.07 Demonstrate knowledge of the dynamic simulation parameters required to make cloth and hair perform to production requirements.		
37.08 Demonstrate knowledge of how cloth and hair interact with other objects.		
38.0 Demonstrate knowledge of cell-shading--The student will be able to:		SC.912.P.10.18; SC.912.P.10.20; SC.912.N.3.5
38.01 Understand the history behind cell-shading.		
38.02 Determine the appropriate use of cell shading techniques.		
38.03 Determine cell-shading requirements needed for a model based on production design sheets and reference images.		
38.04 Demonstrate knowledge of lighting techniques used with cell-shading.		
38.05 Determine appropriate render settings for cell-shading.		
38.06 Determine appropriate materials and shaders to be used with cell-shading.		
39.0 Demonstrate knowledge of texture baking–The student will be able to:		
39.01 Describe the advantages of baking textures.		
39.02 Determine the appropriate use of baking textures.		
39.03 Demonstrate texture-baking procedures.		
39.04 Export models with baked textures.		
39.05 Determine appropriate render settings needed for baked textures.		
40.0 Demonstrate knowledge of texture maps–The student will be able to:		SC.912.P.10.18; SC.912.P.10.20; SC.912.N.3.5
40.01 Define the properties of a displacement, bump, and normal maps.		
40.02 Determine the appropriate texture mapping requirements for a model based on production design sheets and reference images.		
40.03 Demonstrate knowledge of displacement map placement tools and techniques.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
40.04 Demonstrate knowledge of bump map tools and techniques.		
40.05 Demonstrate knowledge of normal map tools and techniques.		
41.0 Demonstrate knowledge of 3D paint–The student will be able to:		SC.912.P.10.18; SC.912.P.10.20; SC.912.N.3.5
41.01 Identify available 3D paint programs		
41.02 Demonstrate knowledge of UV mapping tools.		
41.03 Demonstrate knowledge of UV unwrapping and organizational techniques.		
41.04 Prepare a UV map for export for use with photo editing software.		
41.05 Demonstrate knowledge of 3D painting tools within 3D software.		
41.06 Apply painted image map to model.		

Florida Department of Education
Student Performance Standards

Course Title: **3-D Animation Technology 5**
Course Number: **8718150**
Course Credit: **1**

Course Description:

This course focuses on rigging, morphing and facial animation.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
42.0 Demonstrate knowledge of rigging–The student will be able to:		SC.912.N.3.5; SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19
42.01 Define rigging as a process.		
42.02 Define the role of rigger.		
42.03 Identify job titles associated with a rigger.		
42.04 Identify rigging creation in the production pipeline.		
42.05 Demonstrate knowledge of forward kinematics vs. inverse kinematics		
42.06 Demonstrate an understanding of the joint weighting process		
42.07 Demonstrate the proper hierarchical structure of goals and nulls to construct effective control objects.		
43.0 Demonstrate knowledge of morphing–The student will be able to:		SC.912.N.3.5; SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16;

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
		SC.912.L.14.17; SC.912.L.14.19
43.01 Define morphing as it relates to animation.		
43.02 Demonstrate knowledge of morphing tools.		
43.03 Demonstrate knowledge of model meshes.		
43.04 Define the model area to be morphed.		
43.05 Create morph target points.		
43.06 Demonstrate knowledge of controllers and relational morphs (driver, driven)		
43.07 Demonstrate knowledge of rotational morphs.		
43.08 Demonstrate knowledge of key frame animation and morph tags.		
44.0 Demonstrate knowledge of facial animation–The student will be able to:		SC.912.N.3.5; SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19
44.01 Demonstrate knowledge of facial modeling techniques in respect to animation.		
44.02 Demonstrate knowledge of phoneme-viseme principles for lip synchronization.		
44.03 Apply facial expression animation to complement lip synchronization.		
44.04 Break down a script into a sound chart.		
44.05 Create a set of controls for each sound and expression.		
45.0 Demonstrate knowledge of advanced rigging–The student will be able to:		SC.912.N.3.5; SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19
45.01 Determine use for advanced rigging.		
45.02 Demonstrate knowledge of advanced rigging tools.		
45.03 Prepare rigged model for animation.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
45.04 Demonstrate knowledge of advanced scripting as it relates to rigging.		
45.05 Create complex rigs for greater precision and control.		
45.06 Demonstrate knowledge of deformers (muscle).		
45.07 Demonstrate knowledge of motion capture rigging.		
45.08 Determine necessary joint, bone hierarchy for motion capture rigging.		
45.09 Apply pre-captured motion data to a motion capture rig.		

**Florida Department of Education
Student Performance Standards**

Course Title: 3-D Animation Technology 6
Course Number: 8718160
Course Credit: 1

Course Description:

This course focuses on motion capture systems and production.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
46.0 Demonstrate knowledge of motion capture systems--The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19; SC.912.P.10.18; SC.912. P.10.20
46.01 Demonstrate knowledge of the history of motion capture.		
46.02 Demonstrate the awareness of emerging technologies in the industry.		
46.03 Demonstrate understanding of motion capture for 3D production.		
46.04 Define the role of a motion capture technician.		
46.05 Demonstrate understanding of optical, magnetic, and mechanical systems.		
46.06 Demonstrate understanding of software based or simulated motion capture systems.		
46.07 Demonstrate understanding of the motion capture production pipeline.		
47.0 Demonstrate knowledge of motion capture system setup–The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17;

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
			SC.912.L.14.19; SC.912.P.10.18; SC.912.P.10.20
47.01	Determine the capture volume based on available space and cameras.		
47.02	Demonstrate understanding of XYZ perimeters in lab orientation.		
47.03	Demonstrate ability to properly position and calibrate capture cameras or sensors.		
47.04	Demonstrate ability to safely connect camera/sensor cables to the capture computer station securing cables across walkways.		
47.05	Demonstrate understanding of motion capture computer hardware requirements and software security dongles.		
47.06	Determine hardware and software requirements for motion capture software; update computer operating system as needed and install or update motion capture software.		
47.07	Demonstrate understanding of motion capture specific tools and instruments.		
47.08	Demonstrate ability to create individual optical markers and arrays using optical tape and Velcro strapping.		
47.09	Connect and verify real-time motion capture performance software video systems.		
47.10	Verify capture area to be safe including but not limited to camera/sensor mounts, sand bags, tethers, securing cables, camera power connections and electrical power connections.		
47.11	Complete Mocap Facility Log indicating system user, inventory, previous session review, session time in/out, and any problems or damage parts.		
48.0	Demonstrate knowledge of motion capture preproduction–The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19; SC.912.P.10.18; SC.912.P.10.20
48.01	Identify the use of motion capture as it relates to a production plan.		
48.02	Mark script and shot list for motion capture.		
48.03	Understand the role of a motion capture talent/actor.		
48.04	Rehearse performance with talent to be captured.		
48.05	Identify necessary captured performance props.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	48.06 Determine real-time video needs.		
49.0	Demonstrate knowledge of motion capture production–The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19; SC.912.P.10.18; SC.912.P.10.20
	49.01 Verify maker locations and connections to be used.		
	49.02 Demonstrate ability to properly fit motion capture suit for talent/actor.		
	49.03 Demonstrate ability to properly place markers on talent/actor/prop.		
	49.04 Demonstrate understanding of static system calibration and markers.		
	49.05 Demonstrate understanding of dynamic calibration or range of motion.		
	49.06 Open, create, and adjust skeletal rig within motion capture software.		
	49.07 Label markers for use in motion capture software.		
	49.08 Demonstrate understanding of real-time live motion capture.		
	49.09 Demonstrate use of naming conventions and file storage protocol as it relates to the motion capture pipeline.		
	49.10 Record session, saving after each motion capture.		
50.0	Demonstrate knowledge of motion capture post production–The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19; SC.912.P.10.18; SC.912.P.10.20
	50.01 Load session for post clean up.		
	50.02 Identify gaps in data collected.		
	50.03 Determine appropriate cleaning method, correct for physical discrepancies including but not limited to: occlusions, marker fall off, incorrect marker numbers.		
	50.04 Prepare cleaned motion capture data for export.		
	50.05 Import motion capture data into 3D animation or motion package.		

Florida Department of Education
Student Performance Standards

Course Title: **3-D Animation Technology 7**
Course Number: **8718170**
Course Credit: **1**

Course Description:

This course focuses on advanced 3-D animation.

Abbreviations:
FS-M/LA = Florida Standards for Math/Language Arts
NGSSS-Sci = Next Generation Sunshine State Standards for Science

Note: This course is pending alignment in the following categories: FS-M/LA.

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
51.0 Understand the role of a 3D Animator in relation to the production process--The student will be able to:		
51.01 Define animation as a process.		
51.02 Define the role of an animator.		
51.03 Identify job titles associated with an animator.		
51.04 Identify animation in the production pipeline.		
52.0 Demonstrate knowledge of advanced animation--The student will be able to:		SC.912.L.14.13; SC.912.L.14.14; SC.912.L.14.16; SC.912.L.14.17; SC.912.L.14.19; SC.912.N.1.1; SC.912.N.1.6; SC.912.N.1.2; SC.912.N.1.4; SC.912.N.1.6; SC.912.N.3.5
52.01 Demonstrate knowledge of how nondestructive deformers affect animation.		
52.02 Demonstrate knowledge of how muscle deformers integrate with a character rig.		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	52.03 Demonstrate knowledge of transform and animation transfers from one object (or object hierarchy) to another.		
53.0	Demonstrate knowledge of motion graphics--The student will be able to:		
	53.01 Demonstrate knowledge of 3D animated motion graphics.		
	53.02 Demonstrate knowledge of motion graphics tools and techniques.		
	53.03 Demonstrate knowledge of integrated dynamics to simulate gravitational and collision effects.		
	53.04 Demonstrate the integration of standard animation techniques to drive motion graphics elements abased on node-based visual programming.		
	53.05 Demonstrate the applied working knowledge of motion graphics for broadcast application in TV show opens and commercials.		
54.0	Demonstrate knowledge animation behaviors and scripting--The student will be able to:		
	54.01 Determine appropriate use of behaviors and automated animation.		
	54.02 Demonstrate ability to apply behavior to an object.		
	54.03 Demonstrate ability to apply multiple behaviors using node or visual system.		
	54.04 Demonstrate ability to use object-oriented programming language to create scripts.		
	54.05 Demonstrate understanding of scripting console and commands.		
55.0	Demonstrate knowledge of particle systems--The student will be able to:		SC.912.N.1.4; SC.912.N.3.5; SC.912.N.1.1; SC.912.1.6; SC.912.N.1.2; SC.912.P.10.18; SC.912.P.10.20; SC.912.P.12.5; SC.912.P.12.2; SC.912.P.12.4
	55.01 Demonstrate understanding of particle emitters.		
	55.02 Prepare objects to be emitted.		
	55.03 Determine direction of emission and coordinate.		
	55.04 Determine birthrate and lifetime.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
55.05 Determine scale, speed, and rotation.		
55.06 Demonstrate ability to use animated particles.		
55.07 Demonstrate ability to create smoke, fire, sparks using emitters and materials.		
55.08 Apply dynamics to an emitter including wind/gravity.		
55.09 Demonstrate use of keyframe animation or triggers.		
56.0 Demonstrate knowledge of advanced audio production--The student will be able to:		
56.01 Demonstrate ability to record final audio vocal tracks and sound effects.		
56.02 Edit and export sound effects for use in video editing software.		
56.03 Demonstrate the ability to place audio in 3D space using the 3D animation software.		
56.04 Demonstrate the ability to control motion graphics using audio file frequency and amplitude characteristics.		
57.0 Demonstrate knowledge of dynamics (physics)–The student will be able to:		SC.912.N.1.4; SC.912.N.3.5; SC.912.N.1.1; SC.912.1.6; SC.912.N.1.2; SC.912.P.10.18; SC.912.P.10.20; SC.912.P.12.5; SC.912.P.12.2; SC.912.P.12.4
57.01 Demonstrate a basic understanding physics principles (mass, velocity and collision).		
57.02 Determine when to use physics instead of key frame animation.		
57.03 Apply physics tools and commands to models in a simulation.		
57.04 Demonstrate an understanding of rigid and soft bodies.		
57.05 Demonstrate an understanding of forces (gravity, drag, wind).		
57.06 Demonstrate an understanding of collision detection.		
58.0 Demonstrate knowledge of distributed rendering–The student will be able to:		
58.01 Demonstrate understanding of network-based rendering.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
58.02 Demonstrate understanding of computer networks and protocols (DHCP,TCP IP)		
58.03 Identify network server and data storage options.		
58.04 Identify minimum system requirements for client computer nodes.		
58.05 Install render software on server and client computers and verify connection to server using name conventions.		
58.06 Prepare 3D project for rendering and submit through web client to the server.		
58.07 Download completed render sequence from server.		
59.0 Demonstrate knowledge of video compositing software--The student will be able to:		SC.912.N.1.4; SC.912.N.3.5; SC.912.N.1.1; SC.912.1.6; SC.912.N.1.2; SC.912.P.10.18; SC.912.P.10.20; SC.912.P.12.5; SC.912.P.12.2; SC.912.P.12.4;
59.01 Demonstrate understanding file formats and storage options.		
59.02 Identify parts of the software interface. (menus/palettes)		
59.03 Demonstrate ability to use each of the basic tool sets.		
59.04 Demonstrate ability to import file and video to be composited.		
59.05 Demonstrate understanding of layers and compositing.		
59.06 Demonstrate understanding of filters, effects and plug-ins.		
59.07 Demonstrate understanding of motion paths.		
59.08 Demonstrate understanding of lighting effects.		
59.09 Demonstrate understanding of rendering process.		
59.10 Demonstrate ability to mask video.		
59.11 Demonstrate ability to color correct video (brightness, hue, contrast)		
59.12 Demonstrate ability to use vector and color keying tools.		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
59.13 Demonstrate understanding of particle systems.		
59.14 Demonstrate understanding of time correction.		
59.15 Demonstrate ability to export final video to be used with video editing software.		
59.16 Demonstrate ability to prepare the 3D scene for compositing using alpha channel setting in the 3D host as well as object buffers that will be assigned video sources in the compositing software.		
59.17 Demonstrate ability to add camera and lighting positions and rotations for use in the compositing software.		
60.0 Demonstrate knowledge of post-production--The student will be able to:		
60.01 Import composited video into the timeline.		
60.02 Import final audio into the timeline.		
60.03 Edit video using the animatic as a reference.		
60.04 Export video for use in websites, DVDs and other media formats.		
60.05 Encode and assemble DVD for distribution.		
61.0 Develop professional portfolio of work--The student will be able to:		
61.01 Identify elements of a professional portfolio and resume.		
61.02 Examine and determine student work to include in a portfolio and resume.		
61.03 Gather illustrations, audio, video, and work history details to include into portfolio and resume.		
61.04 Understand the use of Internet websites for portfolio distribution.		
61.05 Determine the format for portfolio and resume.		
61.06 Produce resume for final review.		