STRANDS AND STANDARDS

3D GRAPHICS 2

Learning that works for Utah CTE®

Course Description

3D Graphics 2 builds on the foundational skills developed in 3D Graphics 1, guiding students through advanced techniques in 3D modeling and animation using professional-grade software. Students will deepen their understanding of complex concepts such as rigging, skinning, morphing, motion capture, and particle effects, while also learning how to integrate audio elements like sound effects, music, and voiceovers into their animations. Emphasizing both technical proficiency and artistic expression, the course challenges students to design and produce original 3D projects that showcase their creativity, storytelling abilities, and mastery of industry-relevant tools and workflows.

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	35.02.00.00.071
Concurrent Enrollment Core Code	35.02.00.13.071
Prerequisite	3D Graphics 1 or equivalent experience
Skill Certification Test Number	8182
Skill Certification Cut Score	**PILOT – 80%**
Test Weight	0.5
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Multimedia

Updated: JULY 2025

STRAND 1

3D Modeling:

Students will be able to identify proper modeling techniques for hard surface and organic models.

Standard 1

Students will demonstrate hard surface modeling techniques

- Boolean operations – Combines, subtracts, or intersects objects to create complex shapes.
- Subdivision surfaces – Smooths and refines a low-poly mesh to create detailed surfaces.
- Box modeling – Begins with a primitive shape, then extrudes and adds edge loops to add details.
- Patch modeling – Begins with a single quad then extrudes and adds edge loops to add details.

Standard 2

Students will demonstrate organic modeling techniques

- Proper topology and edge flow techniques
  - Quads
  - Triangles
  - Edge Lops
  - Edge Rings
- Include sculpting
- Retopology of sculpted objects
  - Vertices (or Verts) – These are points in 3D space, forming the corners of a model.
  - Edges – Lines connecting two vertices, defining the model's structure.
  - Faces – Flat surfaces enclosed by edges, making up the visible areas of a 3D model.
  - Topology – The way vertices, edges, and faces are connected and arranged, influencing the shape and performance of a 3D model.
  - Mesh – A collection of vertices, edges, and faces that form the basic structure of a 3D model.
  - Triangles – The simplest polygon, with three sides and three vertices.
  - Quads – A polygon with four sides and four vertices.
  - Edge Loops – A series of connected edges that form a closed loop, often used to create smooth shapes and control deformation.

Performance Skills

Demonstrate hard surface and organic modeling techniques

STRAND 2

Students will understand & use 3D Texturing and Materials

Standard 1

Students will demonstrate a strong understanding of the principles of texturing and materials creation, including color theory, texture mapping, and material properties.

- Apply principles of color theory to create cohesive and effective 3D textures and materials.
- Use UV mapping techniques to apply textures to 3D models
- Utilize different material properties to create realistic and stylized shaders

Standard 2

Students will be able to use advanced texturing and material creation tools to create high-quality 3D textures and materials with a variety of properties and effects.

- Use advanced texturing and material creation tools to create high-quality PBR (Physically Based Rendering) 3D textures and
- materials
- Create different material properties to create realistic and stylized materials
  - Specular Maps
  - Transparency Maps
  - Color / Diffuse / Albedo Map
  - Bump Map
  - Normal Map
  - Displacement Map

Performance Skills

Students will create and manipulate textures in a 3D graphic project.

STRAND 3

Students will understand 3D Lighting

Standard 1

Students will demonstrate proficiency in using advanced lighting techniques and tools to create realistic or stylized lighting setups for 3D environments and models.

- Lighting techniques to create realistic lighting setups.
  - global illumination
  - physically based rendering
  - image based lighting (IBL)
    - HDR / HDRI – High Dynamic Range (Imaging)
- Create and optimize lighting pipelines

Standard 2

Students will be able to use lighting to enhance the mood, atmosphere, and storytelling of 3D projects.

- Use lighting to create specific moods and atmospheres
- Use lighting to enhance the storytelling of 3D projects

Performance Skills

Students will use advanced lighting techniques in a project.

STRAND 4

3D Asset Creation

Standard 1

Students will demonstrate proficiency in creating 3D assets for a specific purpose, including game assets, animation assets, industrial design, etc.

- Identify polycount limitation
- Edge flow
- High Poly
- Low Poly

Standard 2

Students will be able to optimize and organize 3D assets for efficient use in their intended workflow.

Standard 3

Students will understand File formats and their appropriate use

- FBX
- OBJ
- STL
- GLB

Performance Skills

Students will understand asset creation and management.

STRAND 5

3D Rendering

Standard 1

Students will demonstrate proficiency in setting up and optimizing rendering pipelines for different types of projects, including photorealistic, stylized, real-time rendering, GPU rendering, CPU rending, etc.

- Test renders
- Instancing

Standard 2

Students will be able to use advanced rendering techniques and post-processing effects to create high-quality 3D renders with photorealistic materials and lighting.

- Compositing
- Color Correction

Performance Skills

Students will be able to apply advanced rendering techniques.

Workplace Skills

Workplace Skills taught:

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability

Skill Certification Test Points & Questions by Strand

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions
		1	**2**	**3**	**4**	**5**							
3D GRAPHICS 2	8182	6	5	7	5	6							
		Number of Questions by Strand											
		1	**2**	**3**	**4**	**5**							
		4	5	5	5	5						29	24