3D Graphics

Exam Information

Exam number
818

Items
31

Points
35

Prerequisites
Digital Media 2 or teacher approval

Recommended course length
One semester

National Career Cluster
Arts, A/V Technology, & Communications

Information Technology

Science, Technology, Engineering, & Mathematics

Performance standards
N/A

Certificate available
Yes

Description

In this course, students will learn how to create and manipulate 3D models using specialized software. They will explore various aspects of 3D graphics, such as texturing, mapping, lighting, camera movement, and rendering. They will apply their skills and knowledge to produce realistic and artistic 3D images.

Exam Blueprint

Standard	Percentage of exam
1. Career Opportunities	6%
2. 3D Scene Creation	23%
3. Model 3D Objects	23%
4. Surface Materials to 3D Models	20%
5. Lighting and Camera Techniques	17%
6. Render 3D Models	11%

Standard 1

Students will identify the career opportunities available within 3D Graphics.

Objective 1 Identify applications in the following areas:

1. Identify uses of 3D in Entertainment
2. Identify uses of 3D in Health Sciences
3. Identify uses of 3D in Architecture and Engineering
4. Identify uses of 3D in Aerospace
5. Identify uses of 3D in Advertising
6. Identify uses of 3D in Graphic Design and Illustration
7. Identify uses of 3D in Manufacturing and 3D Printing

Objective 2 Identify career awareness related to working in the 3D Graphics industry.

1. Demonstrate career awareness in the 3D Graphics industry
2. Identify the following job titles and responsibilities: Industrial Designer, Technical Director, Graphic
3. Designer, Lighting Technician, Character Modeler, Texture Artist, Render Artist, Environmental Artist, etc.
4. Identify Post-Secondary Education programs and degrees related to the field

Performance Skills

1. Identify various applications of 3D graphics.
2. Identify career opportunities in the 3D graphics and animation industry.

Standard 2

Students will create a basic 3D scene.

Objective 1 Demonstrate basic 3D application navigation.

1. Cartesian coordinate system (x, y, z)
2. Grid
3. Snap
4. Perspective vs. orthographic views
5. Workspaces
6. Understand basic keystroke and shortcut keys
7. Wireframe vs. solid shading

Objective 2 Create a 3D scene.

1. Create Primitive shapes (Cone, Cube, Sphere, Cylinder)

2. Modify Primitive shapes (Translate/Move, Scale, Rotate)
3. Model basic background or environment
4. Add surface materials
5. Set cameras and lighting
6. Render the scene

Objective 3 Organize scene models.

1. Understand Model Hierarchy (parent/child relationships)
2. Naming conventions
3. Combine/Join geometry
4. Add and remove Grouping (collections)

Performance Skills

Create, organize, and render a basic 3D scene.

Standard 3

Students will model 3D objects.

Objective 1 Understand and edit basic polygon model components.

1. Vertices
2. Edges
3. Faces
4. Pivot/Origin Point

Objective 2 Use additional techniques to create, modify, and edit polygon models.

1. Extrusion
2. Boolean
3. Beveling
4. Lathe/Revolve/spin
5. Insert edge loop (loop cut)
6. Duplication and Mirroring
7. Make a surface from Curves (lofting/skinning)
8. Subdivision
9. Reference image
10. Sculpting geometry

Performance Skills

Create 3D objects using multiple modeling techniques.

Standard 4

Students will apply surface materials to 3D models.

Objective 1 Create, apply, and edit surface materials.

1. Imported Texture vs. Procedurals
2. Transparency/Opacity
3. Reflectivity/Specularity
4. Normal Maps/Bump Maps
5. Displacement/Height Maps
6. Luminosity
7. Color/Albedo Maps

Objective 2 Create and edit UV Maps.

1. Unwrap
2. Unwrapping
3. Optimize

Performance Skills

Students will apply appropriate materials to 3D models.

Standard 5

Students will understand and apply lighting and camera techniques.

Objective 1 Apply lighting effects.

1. Use basic three-point lighting: key, fill, back/rim
2. Use other lighting techniques: indoor, outdoor, mood, artistic, etc.
3. Understand & use 3D specific lighting sources: Global/Image Based, Directional, Spotlights, Point Light, etc.

Objective 2 Effective use of camera techniques.

1. Aspect Ratio
2. Staging
3. Focal Length
4. Camera Angle (bird's eye, worm's view, etc.)
5. Shot Framing (close-up, medium, and wide, etc.)

Performance Skills

Students will be able to apply various lighting and camera techniques to enhance quality of composition.

Standard 6 (Optional)

Students will render 3D models.

Objective 1 Introduce and apply the mechanics of rendering.

1. Understand render engines
2. Adjust lighting
3. Demonstrate the use of different output file types (i.e.: PNG, TIFF, JPEG, etc.)
4. Output appropriate resolutions and destinations
5. Use appropriate naming conventions

Performance Skills

Students will be able to finalize their projects by using the appropriate render setting.

Workplace Skills

1. Communication
2. Problem Solving
3. Teamwork
4. Critical Thinking
5. Dependability
6. Accountability