



## **EXAM INFORMATION**

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**Items**

41

**Points**

43

**Prerequisites**

NONE

**Grade Level**

9-12

**Course Length**

ONE SEMESTER

**Career Cluster**

ARTS, A/V TECHNOLOGY, AND  
COMMUNICATION, INFORMATION  
TECHNOLOGY, MANUFACTURING,  
SCIENCE, TECHNOLOGY,  
ENGINEERING, AND MATHEMATICS

**Performance Standards**

NOT INCLUDED

**Certificate Available**

YES

## **DESCRIPTION**

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Students will use 3D graphics software to produce 3D models. This course will introduce students to 2D and 3D modeling, the creation and application of textures, mapping, lighting, and rendering of 3D models.

## **EXAM BLUEPRINT**

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**STANDARD**

**PERCENTAGE OF EXAM**

1- Career Opportunities	9%
2- 3D Software Tools	14%
3- 3D Polygonal Object	30%
4- NURBS Curves	16%
5- Textures and Materials	19%
6- UV Maps (Optional)	
7- Lighting	12%
8- Scene (Optional)	



## STANDARD 1

STUDENTS WILL IDENTIFY THE CAREER OPPORTUNITIES AVAILABLE WITHIN 3D GRAPHICS AND ANIMATION

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 Graphics in 3D Printing

Objective 2 Develop career awareness in 3D Graphics and Animation.

1. Identify the following job titles and responsibilities: Character Modelers, Texture Artist, Renderer, Lighter, Set Modeler
2. Identify postsecondary education programs and degrees related to the field
3. Develop the following professional behaviors including: Punctuality, responsibility, teamwork, ethics

## STANDARD 2

STUDENTS WILL UNDERSTAND AND UTILIZE 3D SOFTWARE TOOLS AND INTERFACE

Objective 1 Introduce basic 3D terminology and 3D user interface.

1. Panels
2. Perspective and Orthographic views
3. Timeline
4. Navigate Viewport – Tumble, Pan, Tilt, Zoom
5. Manipulators – Translate (Move), Rotate, Scale
6. Basic Menu Functions: Open, Save, Import/Export, Duplicate/Clone, Layers
7. Model Views - Wireframe, Shaded, Lighted
8. Cartesian coordinate system – X-axis, Y-axis, Z-axis

## STANDARD 3

STUDENTS WILL BE ABLE TO MODEL A 3D POLYGONAL OBJECT

Objective 1 Create and manipulate polygonal primitive objects.

1. Use Cube, Sphere, Plane, Cone, Cylinder, Torus
2. Translate (Move), Rotate, Scale primitives

Objective 2 Identify and manipulate components of a polygonal object.

1. Face, Edge, Vertex

Objective 3 Edit polygonal models.

1. Extrude
2. Bevel
3. Duplicate
4. Mirror
5. Combine



6. Separate
7. Edit Pivot Point
8. Subdivide
9. Smooth
10. Group
11. History

#### STANDARD 4

STUDENTS WILL BE ABLE TO MODEL NURBS CURVES

- Objective 1 Create and manipulate NURBS curves.
1. Create Cube, Sphere, Plane, Cone, Cylinder, Torus, Curve
  2. Translate (Move), Rotate, Scale
- Objective 2 Identify and manipulate components of a NURBS curve insert indicator text.
1. Isoparms, Vertex, Curve
- Objective 3 Edit NURBS curve.
1. Loft/Skin
  2. Revolve/Lathe/Spin
  3. Planar
  4. Extrude
  5. Trim
  6. Project curve on surface
  7. Stitch

#### STANDARD 5

STUDENTS WILL BE ABLE TO CREATE AND APPLY TEXTURES AND MATERIALS

- Objective 1 Understand shaders including:
1. Diffuse Shader (Lambert)
  2. Specular Shader (Blinn, Phong, Anisotropic)
  3. Procedural Texture
  4. Other software specific shaders
- Objective 2 Adjust material attributes.
1. Color
  2. Ambient Color
  3. Diffuse
  4. Transparency/Opacity
  5. Specularity
  6. Reflectivity
  7. Luminosity
  8. Bump/Normal Map
  9. Displacement Map
- Objective 3 Create an image plane to use as reference for modeling.



### **STANDARD 6 (Optional)**

STUDENTS WILL BE ABLE TO UNDERSTAND AND EDIT UV MAPS

- Objective 1 Edit UV Maps.
1. Move, Rotate, Scale, Separate
  2. Create UV Map Projection/Unfold UV
- Objective 2 Attach texture to model.

### **STANDARD 7**

STUDENTS WILL BE ABLE TO UNDERSTAND AND SETUP LIGHTING

- Objective 1 Use and understand the following lighting.
1. Point Light
  2. Spot Light
  3. Ambient Light
  4. Directional Light
- Objective 2 Setup three-point lighting.
1. Key Light
  2. Fill Light
  3. Back/Rim Light
- Objective 3 Adjust attributes of lighting.
1. Color
  2. Intensity
  3. Shadows

### **STANDARD 8 (Optional)**

STUDENTS WILL BE ABLE TO RENDER A SCENE

- Objective 1 Adjust render settings.
1. Quality
  2. Resolution
  3. Aspect Ratio
- Objective 2 Save and render as an image and understand the following file types:
1. JPG
  2. PNG
  3. TIFF
  4. TARGA
- Objective 3 Understand raytracing.