



## CG Cookie Blender Curriculum 2.0 User Guide

**Welcome to the CG Cookie Blender Curriculum 2.0.** This curriculum is designed to help anybody start implementing a 3D Modeling and Animation program in a classroom setting, using Blender Software.

Blender is a constantly changing program that CG Cookie strives to keep up to date with. This curriculum is designed and is being prepared with that in mind.

The idea around this updated version (2.0) is a curriculum that is broken down into flexible Units and Lessons. The Units and Lessons will be updated as the software Blender changes versions and new content is released from CG Cookie content is released from CG Cookie.

**Pro Tip:** *While this curriculum is designed to be paired with CG Cookie content, it also contains key concepts that are important for anybody pursuing a career in 3D Graphics and Animation. This curriculum is designed to get instructors started and comfortable using Blender in any classroom setting from Junior High to College.*

No classroom environment is the same, nor do all students learn the same way. We have designed this curriculum to help you to get the most out of this bundle, while at the same time give you the flexibility to build a 3D Modeling and Animation program that supports your individual classroom environment needs.

The curriculum is designed around two core units.

- **Unit 1 - Getting Started with Blender.**
  - Designed around [CG Cookie's FREE Blender Basics course](#), this is a great primer for any classroom.
- **Unit 2 - Intro to Modeling with Blender**
- **Unit 3 - Materials and Textures**

Unit 2-3 are designed around CG Cookie's content included within the Educators Blender Bundle.

Each UNIT has a set of LESSONS that are designed to build on each other that leads to a final unit assessment.

Each Lesson contains the following sections.

### **CG Cookie Videos**

The video the instructor should use within each lesson.

### **Key Training**

The major focus of this lesson in bullet form.

### **Instructor Focus and Tips**

What you should focus on as an instructor, and pro-tips that will help with classroom management.

### **Student Activities and Assignments**

Hands on activities and assignments that engage students.

### **Blender Terminology, Commands and Hotkeys Introduced**

Any new Blender Terminology, Command and Hotkeys introduced in this lesson.

### **BellRinger Prompts and Ideas**

Blender specific bellringers to use in your classroom as you see fit. Bellringers are a technique of using questions or tasks posted before students enter the classroom. They are to be completed as the class starts or, as the name suggests, as the bell rings.

*E.g. Post a question up on the marker board for students to begin thinking about or answer as they get settled.*

### **Exit Ticket Prompts and Ideas**

3D modeling and Blender specific questions you can use for Exit Tickets in your classroom. Use this technique in order for students to demonstrate what they are thinking and what they have learned at the end of a lesson. Before students leave, they have to hand you a “ticket” filled out with an answer to a question, a solution to a problem, or a response to what they’ve learned. Exit Tickets help you assess if students have “caught what you taught” and plan for the next lesson or unit of instruction.

*E.g. Students fill out a quick online survey at the end of the class about what they learned before they leave the class.*

### **Learning Targets**

Learning targets in student friendly language that you can post in the classroom.

## Extended Learning Activity

In this area you'll find some ideas for extended learning opportunities.

## Rubric

Each lesson contains a grading rubric. These rubrics can be used while assessing students progress in class.

## Standards

The standards are **Framework Cross Reference**. This curriculum is part of a defined framework. This framework is a collection of standards, objectives, and indicators used for industry and professional certification. **This framework can be helpful when it comes to getting your course approved through your local or state agency.** Each lesson has been cross-referenced to this framework. A complete list of standards are at the end of this document.

## Unit Assessments

At the end of each unit, assessment ideas are integrated within the end of each unit.

## Continuing Projects

There are three continuing projects. Each projects starts from the Blender Basics videos and builds on it. Here is a brief overview of the projects.

### Mesh Modeling Object Project

- Unit 1 - Students will create 3 base objects a *sphere, cube and cone*.
- Unit 2 - Students will transform the 3 objects into advanced objects
- Unit 3 - Students will add materials and texture paint the objects. Students will set up lighting and render the 3 object for presentation,

### Do you want to build a Snowman Project

- Unit 1 - Students will create a tree and snowman as part of the blender basic course.
- Unit 2 - Students will modify the tree using edit commands. Create a winter wonderland scene with trees and a snowman.
- Unit 3 - Students will add textures and materials to the scene.

### Space the final frontier Project

- Unit 1 - Students will create a planet scene as part of the blender basics course.
- Unit 2 - Students will create a small space shuttle for the space scene.
- Unit 3 - Students will add materials and textures to the planet and shuttle.

## Helpful classroom strategies

Start the first 5 to 10 minutes of the class with a Bellringer activity that focuses on industry or previous lesson.

After the start activity, give a short intro to the lesson, and then have the students watch and practice with the video. Give the students the option to practice while watching the video or to watch the video, then practice.

While students are working on the lesson, be available to answer questions. Watch to see if students are struggling with anything while practicing. Once the students are done watching the video, review key learnings, and go over anything you see the majority of students struggling with.

Leave the last few minutes of class for a Exit Ticket and structured free time. Let the students play with Blender and try new things on their own. You will most definitely have a student that wants to create something; this is the time for them to work on it. As the class progresses, slowly increase this time.

## Setting up for students to submit work for grading

Set your requirements for student work submittal before starting Blender. Show students how you want them to submit their work. Have a system ready in place at the start of class, and practice getting them into this habit.

There are several ways to have student show proof of work, such as:

- Have the student create a render image and submit to a student drive, or another way of submitting files.
- Have the student take a screenshot of their Blender file. I use this when I want to make sure students are getting that lesson's concepts or as a quick proof of completed work.
- Using a screenshot instead of having students submit a blend file is a time saver when it comes to grading.
- As students are working on lessons or projects, document completion of tasks on a rubric.

- Encourage students to upload render images or models to their CG Cookie account. On <http://cgcookie.com> they can obtain peer feedback. *Be sure to check with your district regulations on requiring students to upload to a 3<sup>rd</sup> party site.*
- Give a quick demonstration on how and where to save Blender files. Show the students how to change to camera view by using the **Hotkey: Numpad 0**. Show student how to make a quick render by using the **Hotkey: F12** and saving it as a PNG file by using the **Hotkey: F3**.

## Suzanne Drill

Sometimes, it's a good idea to start the class with a Suzanne drill, **a version of Simon Says with the computer**. This drill is designed to get students comfortable and proficient with Blender. I usually introduce this drill as part of learning the Blender Interface. Part of the drill is switching between saying the hotkey and a description of what you want done.

This is how the drill works: Have the students start a Blender file. Remind them to use one hand on the keyboard and one hand on the mouse. Then say the command that you have been focusing on in the class. Switch it up by changing from the actual hotkeys to only a description of what you want done. Walk around the classroom and observe students. Do this for about 5 minutes. Don't worry about results, remind students that this is for fun and for practice. As you wrap up the drill, introduce the new commands students are about to learn.

Ways to present commands to students during a Suzanne Drill:

Hotkey to use	Description of what you want done.
Numpad 7	Change to top view
Tab	Toggle to Edit Mode
R with Cube selected	Rotate Cube
Shift-A, Select mesh object, Monkey	Insert a Monkey
R with Monkey Selected	Turn Suzanne(Monkey) upside down

## Rendering in the classroom

One of the challenges of working with any animation software that requires a rendering process is managing it in the classroom. You need to balance the amount of time that it takes to render objects, and avoid situations where students are sitting and waiting for an animation or model to render.

### Here are some tips:

- Have projects and assignments available for students to work on while they are rendering long images or animations. These assignments should not be computer intensive. Some of the assignments I have ready are things such as creating a storyboard, researching the history of animation or 3D modeling, and researching a command or process.
- Have a few extra computers in the classroom designated as render computers. Require students to only use those computers for rendering. Have a rendering request form with settings. Have top students be render managers. You can also set these computers up as a render farm.
- Accept student's files as if they had rendered it. Give them credit if the file is setup right to be rendered. Great for when in a time crunch, or when close to grading time.
- Set your classroom computers up as a render farm. CG Cookie has two great tutorials on setting up a render farm, which can be found here: <https://CGCookie.com/tutorial/setting-up-a-renderfarm> and here: <https://CGCookie.com/tutorial/rendering-a-single-frame-faster-with-multiple-computers>.

### Personal Educator tips for working with students:

- Watch the videos and practice the exercise before presenting the information to students.
- Make sure to be running the same version of software on all the computers in the class, including the instructor's computer.
- If a student asks a question and you do not know the answer, let them know that you do not know. Have a place for students to write out questions and get back to that student. *If have a School group Citizen account with CG Cookie, reach out to your advisor if needed.*

- As the students watch the videos and do the exercises wander around and watch for common problems the students might be having. After the lesson or during the next class session address those problems.
- Be accessible all the time during the class. Be active with what is happening. Do not just set out projects or videos, and then go sit back at your desk and expect students to absorb the information.
- Encourage and allow students to help each other. Notice some of the rubric account for students helping each other.
- Give time for students to practice working with the software. If students have completed an assignment, encourage use of software to create their own projects. I sometimes give students more time than need to complete an assignment so it encourage playing with the software.

# Introduction to 3D Modeling and Animation Framework

This framework is a collection of state standards used by [Precision Exams](#), and Washington State Animation Instructors, realigned to match the CG Cookie Beginning Blender Modeling and Animation Curriculum.

## Standard 1: 3D Modeling Application Interface

- **Objective 1: Introduce basic 3D terminology and the 3D application interface.**
  - o Indicator 1: Know 3D modeling terminology
  - o Indicator 2: Identify parts of the 3D application interface
- **Objective 2: Manipulation of 3D application interface**
  - o Indicator 1: Use application interface
  - o Indicator 2: Navigating 3D space
  - o Indicator 3: Navigating views
  - o Indicator 4: Use different shading modes (solid, wireframe)
- **Objective 3: Manipulation of objects**
  - o Indicator 1: Selecting and transforming objects
  - o Indicator 2: Adding and removing objects

## Standard 2: Modeling 3D Objects

- **Objective 1: Use and manipulate 3D graphics and primitives**
  - o Indicator 1: Use 3D primitives
  - o Indicator 2: Manipulate 3D models and primitives
- **Objective 2: Create, use and manipulate shapes**
  - o Indicator 1: Create 3D Shapes
  - o Indicator 2: Use 3D Shapes
  - o Indicator 3: Manipulate 3D shapes
- **Objective 3: Edit Models**
  - o Indicator 1: Modify edges, faces, vertices
  - o Indicator 2: Edit an object after its been created
  - o Indicator 3: Subdivide a model
  - o Indicator 4: Extrude edges, faces, vertices
  - o Indicator 5: Use Reshape/Convert
  - o Indicator 6: Use Insetting
  - o Indicator 7: Use Beveling
  - o Indicator 8: Deleting and duplicating edges, faces, vertices

## Standard 3: Lighting

- **Objective 1: Lighting Object Types and Terminology**
  - o Indicator 1: Know lighting terminology
  - o Indicator 2: Identify parts of the 3d application interface used with lighting
- **Objective 2: Apply lighting effects**
  - o Indicator 1: Use basic three point lighting for artistic effect: key, fill, rim
  - o Indicator 2: Use other realistic lighting: indoor, outdoor, mood, artistic, etc.
  - o Indicator 3: Understand & use 3D specific lighting sources: Global/Image Based, Directional, Spot Lights, Shadows/Shading, Point Light

## Standard 4: Surface Materials

- **Objective 1: Surface Material Terminology**
  - o Indicator 1: Know surface material terminology
  - o Indicator 2: Identify parts of the 3d application interface used with surface materials
- **Objective 2: Create, apply and edit UV mapping**
  - o Indicator 1: Prepare model for UV Mapping
  - o Indicator 2: Create and edit UV Mapping
- **Objective 3: Create, apply and edit textures**
  - o Indicator 1: Create image textures using 3d application interface
  - o Indicator 2: Create 2D and 3D textures for 3D Models
  - o Indicator 3: Export 3d mapping and textures for external editing
  - o Indicator 4: Create procedural textures
  - o Indicator 5: Apply textures to 3D models
  - o Indicator 6: Bake textures
- **Objective 4: Create, apply and edit materials**
  - o Indicator 1: Add and edit material color
  - o Indicator 2: Add and edit material texture
  - o Indicator 3: Add and edit material gloss
  - o Indicator 4: Add and edit material luminosity
  - o Indicator 5: Add and edit material reflectivity
  - o Indicator 6: Add and edit material transparency

## Standard 5: Animate 3D Models

- **Objective 1: Animation terminology**
  - o Indicator 1: Know 3D animation terminology
  - o Indicator 2: Identify parts of the 3D application interface used in animation
- **Objective 2: Apply the mechanics of animation**

- o Indicator 1: Use & apply frame rate and animation timing
- o Indicator 2: Use & apply keyframing
- o Indicator 3: Use & apply path animation
- o Indicator 4: Use & apply cycle animation
- o Indicator 5: Use dope sheet and graph editor
- o Indicator 6: Use markers to sync animation
- o Indicator 7: Use and apply rigging
- **Objective 3: Apply the principles of animation**
  - o Indicator 1: Understand & apply Timing/Spacing
  - o Indicator 2: Understand & apply Squash and Stretch
  - o Indicator 3: Understand & apply Anticipation: Action/Reaction
  - o Indicator 4: Understand & apply Arcs
  - o Indicator 5: Understand & apply Slow in, Slow out
  - o Indicator 6: Understand & apply Exaggeration
  - o Indicator 7: Understand & apply Overlap, drag and follow through

## Standard 6: Rendering

- **Objective 1: Rendering terminology**
  - o Indicator 1: Know Rendering terminology
  - o Indicator 2: Identify parts of the 3D application interface used in rendering
- **Objective 2: Apply the mechanics of rendering**
  - o Indicator 1: Output different file types
  - o Indicator 2: Output appropriate resolutions and destinations
  - o Indicator 3: Use appropriate naming conventions
  - o Indicator 4: Adjust shadow and lighting
  - o Indicator 5: Make adjustments to improve render time
  - o Indicator 6: Make adjustments to improve render quality
  - o Indicator 7: Balance render time and render quality
  - o Indicator 8: Make adjustments for rendering multiple animation frames
- **Objective 3: Apply camera effects**
  - o Indicator 1: Adjust Aspect Ratio/Film Back
  - o Indicator 2: Change setting and modifying camera views: Staging and Manipulating, Truck, Pan, Zoom, Dolly.

## Standard 7: Compositing

- **Objective 1: Compositing terminology**
  - o Indicator 1: Know compositing terminology
  - o Indicator 2: Identify parts of the 3D application interface used in compositing
- **Objective 2: Apply compositing**
  - o Indicator 1: Use render layers and passes

- o Indicator 2: Combine render layers and passes
- o Indicator 3: Organize render layers
- **Objective 3: Apply treatments**
  - o Indicator 1: Add treatments to create photo realistic renderings
  - o Indicator 2: Create a motion blur filter
  - o Indicator 3: Create a depth of field filter

## Standard 8: 3D Modeling and Animation Process

### • **Objective 1: Demonstrate the animation process to plan and develop a 3D animation**

- o Indicator 1: Use a project brief and storyboards to plan 3D animation
- o Indicator 2: Set up the scene
- o Indicator 3: Model the objects
- o Indicator 4: Add lighting
- o Indicator 5: Add surface materials
- o Indicator 6: Animate objects
- o Indicator 7: Rendering the project
- o Indicator 8: Compositing the project

## Standard 9: Exploring Careers and History of 3D Graphics and Animation

### • **Objective 1: Identify various applications of 3D graphics and animations**

- o Indicator 1: Identify uses of 3D in Entertainment
- o Indicator 2: Identify uses of 3D in Health Sciences
- o Indicator 3: Identify uses of 3D in Architecture and Engineering
- o Indicator 4: Identify uses of 3D in Aerospace
- o Indicator 5: Identify uses of 3D in Advertising
- o Indicator 6: Identify uses of 3D in Graphic Design and Illustration

### • **Objective 2: Develop career awareness related to working in the 3D graphics and animation industry.**

- o Indicator 1: Identify personal interests and abilities related to 3D Graphics careers.
- o Indicator 2: Identify personal creative talents.
- o Indicator 3: Identify organizational and leadership skills.
- o Indicator 4: Identify special interest areas.
- o Indicator 5: Identify 3D graphics and animation job titles, such as: Animator, Technical Director, Rigger, 3D Modeler, Lighter, Texture Artist, Special Effects.
- o Indicator 6: Investigate career opportunities, trends, and requirements related to 3D graphics and animation careers.
- o Indicator 7: Identify the members of a 3D graphics and animation team.

- o Indicator 8: Investigate trends associated with 3D graphics and animation careers.

- o Indicator 9: Identify factors for employability and advancement in 3D careers.

- **Objective 3: Discuss the relevant history of the 3D graphics & animation industry.**

- o Indicator 1: Identify early 2D and 3D animations on film.

- o Indicator 2: List Key mile markers in animation.

- o Indicator 3: Identify Key figures and animators in animation history.