

3D Modeling Course Syllabus

What you will learn in this course

3D Modeling

Are you interested in a career in technology? Are you curious about working in fields like virtual reality, video game design, marketing, television and motion pictures, or digital imaging? If so, this course in 3D Modeling is a great place to start as it is the foundation for all these career paths. Gain a deeper understanding of graphic design and illustration as you use 3D animation software to create virtual three-dimensional design projects. Hone in on your drawing, photography, and 3D construction techniques and develop the skills needed to navigate within a 3D digital modeling workspace. This course is an excellent introduction to careers in the fast-growing field of technology and design.

Unit 1: What is 3D Modeling?

3D modeling is all around you. You might think of 3D movies or great animations when you think about 3D modeling, though it involves so much more than that. The new skyscraper downtown, that artificial limb given to a wounded veteran, or the latest spacecraft hurling into orbit all likely depended on 3D modeling for their design. With so many uses, 3D modeling is an essential skill in today's world. We'll begin by covering the basics, including what 3D modeling is, how it is done, and what you can do with the skills you acquire.

What will you learn in this unit?

- Define 3D modeling
- Discuss how 3D modeling enhances animation
- Describe two applications of 3D modeling in the real world
- Understand key terms used in 3D modeling
- Identify the advantages and challenges of 3D modeling

Unit 2: The History of 3D Modeling

As long as there has been human society, art has been a part of it. Today, 3D modeling has become an essential part of animation. While its applications go way beyond entertainment, it owes much of its development to innovative artists looking for better ways to represent the worlds they create on film. Even teenagers playing really basic video games in the 1980s were actually moving technology forward by creating a market and pushing companies to make better and better versions. So, 3D modeling has a long history dependent on several different innovations. Exploring how and why 3D modeling evolved gives us valuable insights into how it can be used in the future and the potential of this technology that is still being unlocked.

What will you learn in this unit?

- Identify key developments in the history of animation and 3D modeling
- Explain the role technology played in enhancing 3D modeling techniques
- Describe two current or future applications of 3D modeling
- Articulate social change corresponding with technological developments in 3D modeling

Unit 3: Tools of the Trade

When you turn on your computer and perform a basic function, like checking your favorite social media site, you are actually drawing on the work of a lot of different elements of the computer. From the most basic line of code that tells the computer what to do, to the operating system that makes sure that it prioritizes the task you are working on now, every element of the job your computer is doing was perfectly planned. Everything that makes a computer work comes from decades of technological development. Just as 3D modeling depends on a long history of art, the computers that make it happen have their own histories.

What will you learn in this unit?

- Discuss the history of operating systems and programming languages
- Explain the distinct functions of software and hardware
- Define different types of memory
- Identify the three types of program design approaches

Unit 4: Digital Citizenship and Ethics

Working in 3D modeling isn't all fun and games and an important part of this career is using the resources of the internet wisely. Like any society, the online community has expectations of appropriate behavior. In addition, the accessibility of information has raised new challenges as digital artists want to share their work while making sure that they still get the credit that they deserve. Understanding the basics of copyright and other kinds of permission ensures that you will stay on the right side of the code of conduct, not to mention the law. One of the most exciting elements of 3D modeling is the rate of change and the new possibilities that emerging technology brings.

What will you learn in this unit?

- Discuss the importance of responsible digital citizenship
- Understand copyright dynamics and its application in 3D modeling
- Demonstrate proper attribution and appropriate sources
- Analyze the role of emerging technology in 3D modeling

Unit 5: Creating 3D Environments in Blender

Now that you know a little bit about digital citizenship and copyrights, let's see what you can do with 3D modeling. There are free, open source programs available to get you started, so all you need to do is download them and start developing those valuable skills. Blender is one of these software programs— <http://www.blender.org/>—that offers the opportunity to start exploring the

world of 3D modeling with no commitment or expectation. Besides being readily available to anyone, this digital tool offers detailed tutorial videos for beginners, which makes it the perfect first step. These tips are easily found on the website and will take you through the details of how to design your first 3D character, making excellent use of the digital tools available on the platform. And, because Blender is such a popular program, there are also plenty of tutorials and tips available online; if you have questions or find yourself struggling with certain elements, a quick internet search will likely save the day.

What will you learn in this unit?

- Understand the appropriate uses of 3D objects and related digital tools
- Use the proper digital tools and resources when planning, managing, and executing a project
- Understand the underlying difference between 3D animation software and the animation manipulation interface
- Explain the contrasts among various 3D modeling techniques

Unit 6: Visual Elements

You've likely heard the old adage, "a picture paints a thousand words." Even today, this statement rings true, especially in the imaginative world of art and design. Regardless of the medium you use, every model, video, or creation you produce is infused somehow with your ideas and emotions. The question is simply, "what do you want to say?" Ultimately, the words available to you through 3D modeling are limitless and will eventually be spoken through the object you create.

What will you learn in this unit?

- Explain the process of visualization as it applies to 3D modeling
- Identify and apply color theories using a digital format
- Critique visual structures through the use of basic design principles
- Understand how lighting and perspective create overall effect
- Discuss how visual simulation can be implemented in various industries

3D Modeling Midterm Exam

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from the first six units in this course (Note: You will be able to open this exam only one time.)

Unit 7: The Power of Light and Shade

The right lighting can change a scene to reflect a lot of different moods. Think about it. A narrow street lined with trees and bathed in golden sunlight would likely seem pleasant. However, when the sun goes down and those same tree branches are lit by moonlight and tendrils of fog, the scene becomes more ominous. Lighting is key to how images look and feel. This is why artists

like painters and photographers spend so much time thinking about lighting and how it will affect their final product. For a painter, capturing the light with a paintbrush is essential, while a photographer is always seeking that magical moment of sunset or dawn to enhance the subject. It is no different with 3D modeling, as it uses various lighting techniques to breathe life into dull scenes and fill figures and shapes with a sense of realism.

What will you learn in this unit?

- Understand the basics of lighting and shading
- Discuss different lighting techniques and their applications
- Employ lighting techniques in 3D modeling
- Use commands to execute lighting options

Unit 8: 3D Geometrics

It's often hard to tell how much work and talent goes into 3D modeling just by looking at it. In fact, models that are done well are deceptive in the way they make the process seem easy. But creating 3D scenes and objects is far from simple and demands a breadth of knowledge that includes both method and a dose of math. By embracing the basic concepts of geometry, 3D modelers are able to visualize and execute their designs more effectively and solve spatial problems with less effort. Yes, in the unique world of 3D art, design and math work collaboratively to produce realism and the feeling of a multi-dimensional landscape.

What will you learn in this unit?

- Use the Cartesian Grid to navigate Blender
- Use basic geometry principles to design simple Blender assets
- Apply Blender's Transforms and Modifiers to 3D objects
- Navigate the Blender Viewport using coordinate values

Unit 9: Texturing

As we know, 3D modeling and animation is centered on the need to create realistic objects in a virtual environment. If you are trying to create a 3D human model, your work is not complete until it has a recognizable skin tone with the right type of tactile surface. What exactly this looks and feels like will depend on your goals as a 3D artist. But regardless of the project, you will need a technical understanding of texturing to find success in recreating these details. In fact, model texturing is one of the most important aspects in 3D design and a skill everyone in the field must know.

What will you learn in this unit?

- Explain the technical concepts behind texturing
- Discern basic materials and textures
- Apply texture to 3D models and environments
- Analyze the effects of light and camera angles in 3D modeling

Unit 10: Rendering

One of the most important parts of 3D modeling is the final product. Without it, all the skill, hard work, and technical knowledge you have cultivated have no real purpose. And that's precisely why rendering is such a vital topic—it is the process that allows you to finally achieve the scene, object, or model from your artistic vision. As such, rendering determines the way light and shadow play on objects and whether realism has been achieved. Part of this process uses mathematics to create complex computations, while other parts rely on the artist's sense of how light works. In that way, rendering is an interesting combination of the technical and the artistic and one of the most exciting aspects of 3D art. It is the moment when your vision becomes reality!

What will you learn in this unit?

- Create a 2D image or video from your 3D scene in Blender
- Generate an effective render that brings your 3D model to life
- Understand render engines and know what to look for when selecting a render engine
- Light a scene for ideal rendering
- Set the camera in place and point it in the right viewing direction for an effective render

Unit 11: Environmental Models

Believable environments with accurate renderings are not just entertaining—they also have meaningful applications in the real world. From architecture to gaming to engineering to geology, the process of environmental modeling offers industries and enterprises effective ways to generate data, apply information, and analyze outcomes. And with such a valuable tool, there are few industries that cannot benefit from it in some way. Using the methods and skills of a 3D modeler, it is possible to implement change through a variety of outlets, which makes it one of the most exciting and versatile fields around.

What will you learn in this unit?

- Identify the use of 3D models in various industries
- Use modeling techniques and software to create an environmental model
- Understand how 3D simulation is applied in the real world
- Explain how environmental models impact the larger field

Unit 12: Molding Your Future

If you have ever played a high-quality computer game, you know that realism can be found outside of the natural world. The faces, the places, and the objects within that man-made world are so life-like it's hard to grasp how they were created in the first place. But by now, you likely have a clearer understanding of exactly what it takes to reach this artistic point in the 3D world. With this knowledge, it is possible for you to be the one creating those mind-blowing games, the ones capable of transcending people from their regular lives into an imaginary one without boundaries or definition. Pretty exciting stuff! These kinds of creative jobs feel less like “work”

and more like fantastical play. But, indeed, they are jobs, with practical requirements and expectations, both of which you will need to understand if you hope to join the ranks of successful 3D artists.

What will you learn in this unit?

- Understand software processes and some of the major techniques used in 3D modeling
- Identify industries where you could apply your 3D modeling skills at the professional level
- Understand the necessary steps to implementing these skills into a future career
- Create your own e-portfolio to display your 3D modeling talents

3D Modeling Final Exam

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from units seven to twelve in this course – the last six units. (Note: You will be able to open this exam only one time.)

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