Introduction to 3D Animation with Blender

Course Description:
Now how did they do that?! Ever wonder what it takes to make 3D models and movies like Avatar? In this course, you will develop the skills to make your own 3D models, animations, and movies. Using creative and integrated thinking, you'll create a storyboard, then apply design, engineering and geometry principles to bring your creations to life. By the end of the course, your combined modeling and animation skills will let you create your own 3D production for the whole world to see on your web site.

Prerequisite:
Basic understanding of PC or Mac operating systems and familiarity with the Internet.

Skills:
Moderate logical skills are used.

Difficulty Level:
Entry Level

Note: If students can complete all the projects before Day 6, they will be able to create their own project. The instructor will be able to determine this by the end of the first week. Then they will have weekend homework to create storyboard to describe their project. Emphasize they must complete the project in the remaining class time.

Course Overview:

1. Day 1:
    a. Introduction
    b. Software Interface
    c. Project 1: Make a Hat

2. Day 2 & 3
    a. Project 2: Build a House

3. Day 4 & 5
    a. Project 3: Create Terrain

4. Day 6 & 7
    a. Project 4: Build a Car

5. Day 8
    a. Build neighborhood and animate with car or create own project

Day 1:

Class Goals:

- Demonstrate animation examples
- Examine the tools provided by the software
- Explain that projects are building blocks for larger projects
- Project 1: Make a Hat

Daily Plan:

- **Introductions [30 mins]**
    - Show examples of student animation
- **Program Interface [10 mins]**
    - Info Bar - The main menu. Includes Save, Save As, Load, Render, and more
    - 3D View - The area where you create designs
    - Tool Region - Holds common tools
    - Timeline - Contains frames for animation
    - Properties - Used to control options, parameters, modifiers, etc
    - View name - Orthographic vs Perspective
    - Operator Panel - Show select command parameters
    - Camera - The point of view
    - Lamp - A light source for the scene
    - Properties Region - 3D view parameters. Press N to open it.
- **Project 1: Make a Hat [150 mins]**
    - Introduction and Project Preview
    - Lab 1 - Lab 5
    - Steps are below

Example Demonstrations and Comments

- **Program Interface**
    - Students may get stuck when exploring the interface. Make sure they're in the right editing mode before beginning the project.

Project 1: Make a Hat

1. Lab 1:
    a. Open suzanne.blend or add a new suzanne from the object menu (2)
    b. Look at the difference between object mode and edit mode (3)
    c. Switch to object mode (4)
    d. Move around the 3D space with preset view keys (7)
    e. Learn to zoom (8)
    f. Learn to pan (10)
2. Lab 2:
    a. Open suzanne.blend or add a new suzanne from the object menu (15)
    b. Turn on and learn to use the 3D manipulator (16)
    c. Try out 3D manipulation with translating, scaling, and rotating (17)
    d. Move suzanne using the translate tool (19)
    e. Learn about undoing mistakes (20)
    f. Move along one axis
    g. Scale suzanne (21)
    h. Rotate suzanne (24)
3. Lab 3:
    a. Learn how to use Blender's file navigation (29)
    b. Open a file (30)
    c. Save a file (31)
    d. Learn the difference between Save and Save As (32)
    e. Save a file (33)
4. Lab 4:
    a. Discover the different types of meshes (34)
    b. Learn about the 3D cursor (36)
    c. Add a cylinder to your project
    d. Learn how to change the radius of a cylinder (38)
    e. Learn what a vertex is
    f. Add another cylinder (39)
    g. Translate the cylinders (40)
    h. Learn how to join objects and join the cylinders (41)
    i. Position the Hat (43)
    j. Join the hat and suzanne (45)
5. Lab 5:
    a. Learn about rendering (47)
    b. Learn that the rendering occurs from where the camera is looking
    c. Render the current frame (48)
    d. Change the camera position and render again

e. Check your work and save (51)

6. Project Complete!

Day 2 & 3:

Class Goals

- Learn to model using primitives
- Use primitives to create a house
- Learn how to use textures
- Create an animation
- Save the project for later use in future projects

Daily Plan:

- **Project 2: Build a Home [6 hours]**
    - Introduction
    - Project Preview
    - Lab 1-5
    - Steps below

Project 2: Build a Home

1. Lab 1:
    a. Add a cube (2)
    b. Learn how to Blender grid is setup (4)
    c. Add a plane
    d. Add another plane to act as the door (7)
    e. Move the door (9)
    f. Add another plane for a window (11)
    g. Move the window (12)
    h. Check your work (14)
2. Lab 2:
    a. Create and manipulate cube to act as a roof (15)
    b. Learn about edges in Blender (20)
    c. Change the height of the roof (20)
    d. Change the shape of the roof (22)
    e. Check your work (25)
3. Lab 3:
    a. Learn about materials in Blender (26)
    b. Learn about textures in Blender (27)
    c. Select the window
    d. Find the buttons window (28)
    e. Open the material editor (29)
    f. Add a new material then a new texture (30)
    g. Learn about the Blender lamp (33)
    h. Move the light
    i. Render your image (34)
    j. Add a material to your door (35)
    k. Add a texture to the door (36)
    l. Render the image and save the project (39)
4. Lab 4:
    a. Create a material for the house (40)
    b. Learn how to pick colors (41)
    c. Add a color to a material (42)
    d. Add a texture to your house
    e. Learn to use the Map To mini window (44)
    f. Learn about color in Blender (45)
    g. Learn about color picker arrows (46)
    h. Change the texture color
    i. Create a texture and material for the roof (47)

   j. Render the scene to check your work (48)
5. Lab 5:
   a. Learn about different lighting types in Blender (49)
   b. Change the lighting (51)
   c. Try out the other lighting types (52)
   d. Set the camera location (54)
   e. Learn about paths in Blender in order to animate the camera (55)
   f. Learn about path constraints and create a camera path (56)
   g. Learn about parent and child objects and constrain the camera to the path (58)
   h. Change the paths direction (60)
   i. Learn about making animations in Blender (62)
   j. Follow the steps to save time during rendering (62)
   k. Check your work (63)
   l. If time, try to create a neighborhood or small city for a future project.

Day 4 & 5

Class Goals

- Model using the grid to create a landscape
- Use falloff to create mountains, valleys, and a moon
- Modify light sources
- Use colors, materials, textures, and transparency
- Fly the camera around the terrain to create an animation

Daily Plan:

- **Project 3: Create Terrain [6 hours]**
    - Introduction
    - Project Preview
    - Labs 1-5
    - Steps Below

Project 3: Create Terrain

1. Lab 1:
    a. Setup the workspace (1)
    b. Add a grid (2)
    c. Learn about the transform properties panel (4)
    d. Scale the grid
    e. Learn about proportional editing and falloff (6)
    f. Turn on proportional edit (8)
    g. Make a hill (9)
    h. Create more hills and valleys (11)
    i. Smooth the hills (13)
    j. Save your terrain (14)
    k. Check your work
2. Lab 2:
    a. Learn about specularity (16)
    b. Add materials to your hills
    c. Add a grass texture to your hills (17)
    d. Change your grass texture settings (18)
    e. Check your work (19)
3. Lab 3:
    a. Add a plane (19)
    b. Color the sky (21)
    c. Add a sun or change your lamp (24)
    d. Render the image and check your work
4. Lab 4:
    a. Learn about icospheres (28)
    b. Learn about transparency buttons
    c. Add a moon (29)
    d. Learn about color ramps and colorbands (30)
    e. Set up your colorband (31)
    f. Create a colorband for the moon (32)
    g. Add a texture to the moon (34)
    h. Smooth the moon (35)
    i. Add a light inside the moon (36)
    j. Add a light outside the moon (37)
5. Lab 5:
    a. Add stars (39)
    b. Render the image and check your work (40)

c. Use your experience from the house project to fly your camera around the scene (40)

Day 6 & 7:

Class Goals:

- Building multiple models in different files and combining them
- Modify light sources
- Use colors, textures, materials, and transparency
- Create path for camera and animate
- Model a car and animate it

Daily Plan:

- **Project 4: Build a Car**
    - Introduction
    - Project Preview
    - Labs 1-5
    - Steps Below

Project 4: Build a Car:

1. Lab 1:
    a. Set up the workspace (1)
    b. Save the tire (2)
    c. Make the outside of the tire (3)
    d. Learn about the Blender library (5)
    e. Append the car tire rubber (6)
    f. Add the rubber material (8)
    g. Add a texture to your rubber material
    h. Make the hubcap (11)
    i. Append the chrome material
    j. Add the chrome material(13)
    k. Move and join the hubcap and tire (14)
    l. Check your work
2. Lab 2:
    a. Set up your workspace (16)
    b. Save the car (17)
    c. Add a subdivided grid (18)
    d. Start the grid (19)
    e. Stretch the Grid and finish it (22)
    f. Add depth to the car (23)
    g. Check your work (24)
3. Lab 3:
    a. Append Car paint (25)
    b. Paint your car (26)
    c. Check your work (28)
4. Lab 4:
    a. Append your tire (30)
    b. Arrange the tires (31)
    c. Join the tires to your car (33)
    d. Append asphalt (35)
    e. Make the ground (36)
    f. Move the car (38)
    g. Render (39)
    h. Check your work (40)

Day 8:

Class Goals:

- Use past projects to build a larger final project
- Or work on a personal project

Use past lessons to make your car drive through a neighborhood or city, or create a personal project.