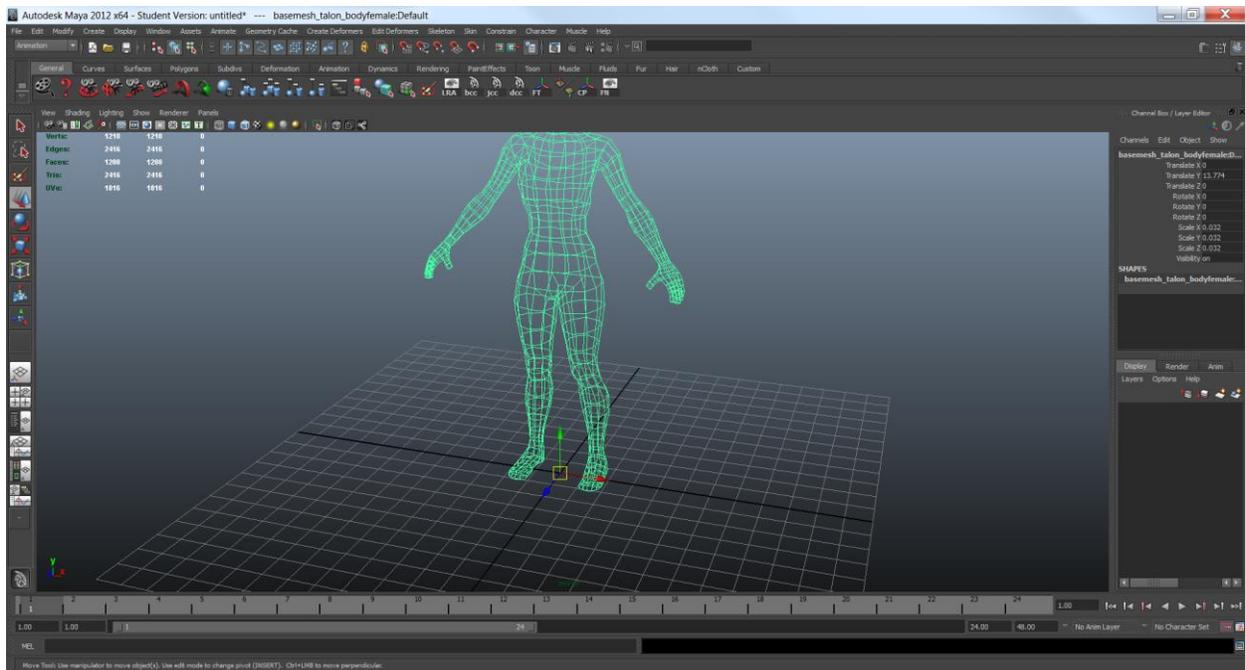
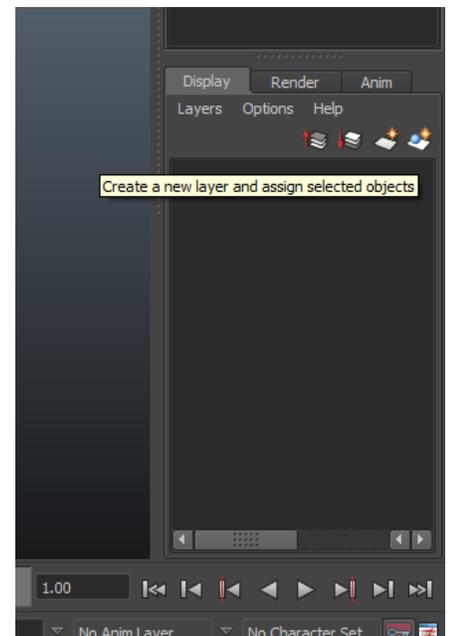
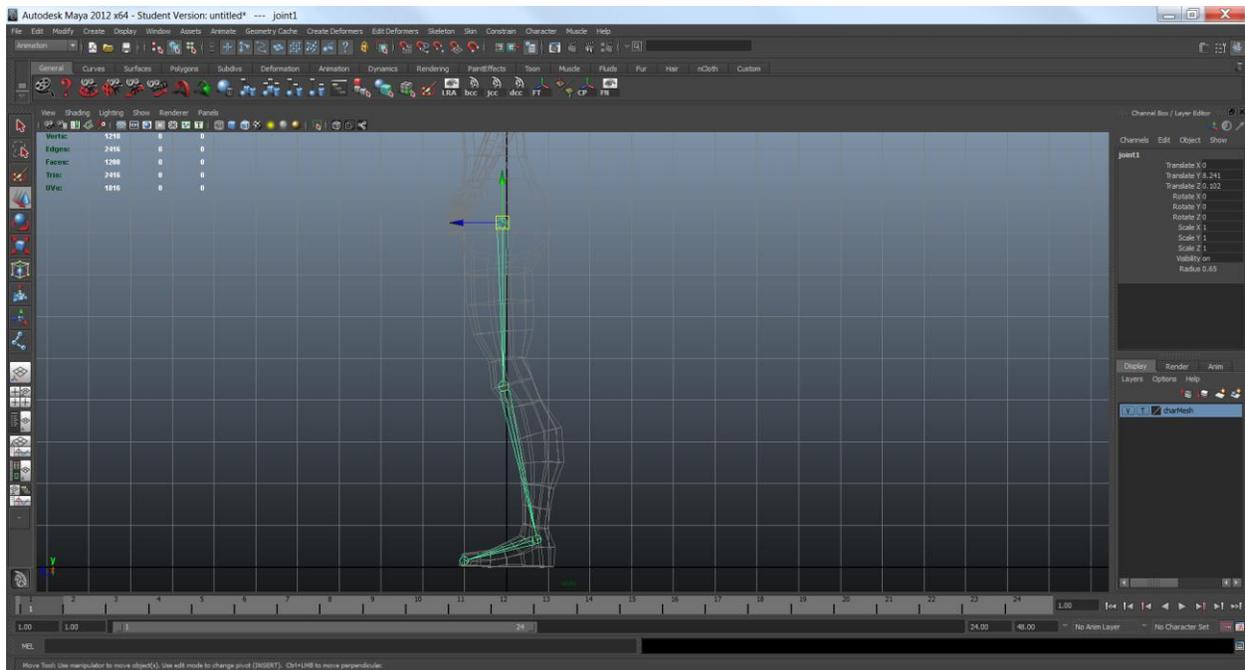


1. Go to file>import and find the model you want to import (if you are looking for the model used in the example you will find it in your flash drive in lesson 4 folder)
2. Click import

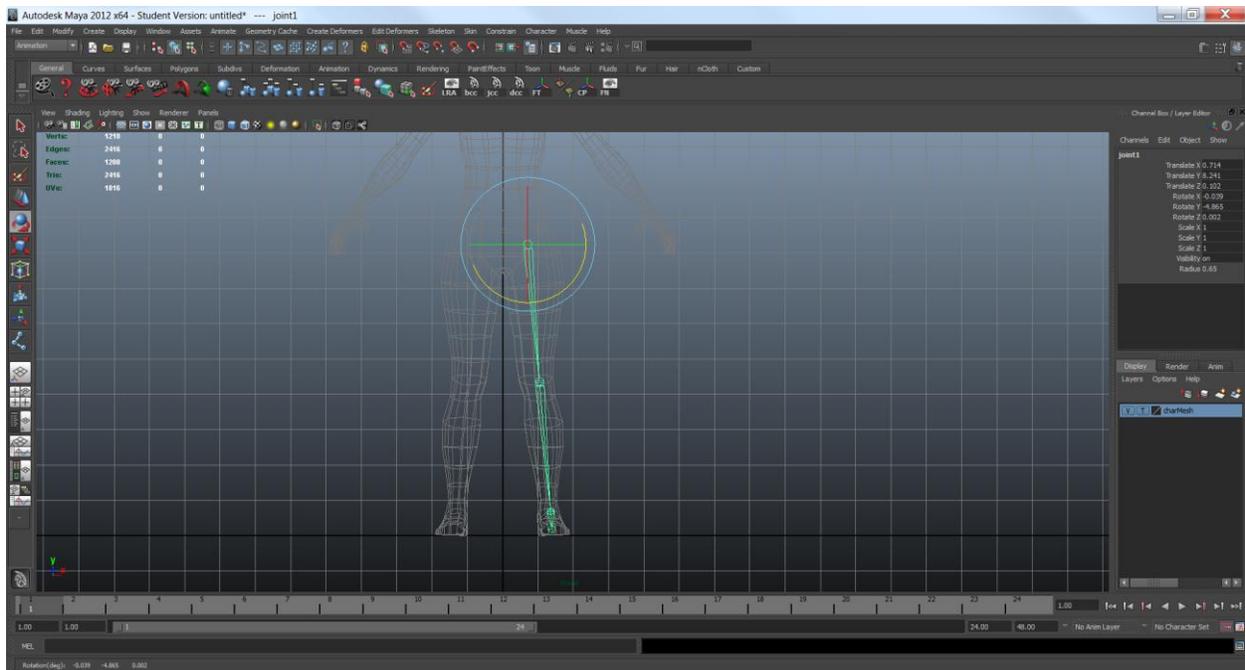


3. Scale the model down and place it on the center of the stage with the feet just touching the grid
4. Center the model's pivot on the grid by selecting the model, holding the 'D' key to mode the pivot, and holding the 'x' key at the same time to use the move tool to snap the pivot to the center of the grid
5. With the model selected, click on the 'create new layer and add object button'. This will make a new layer and put the model in it
6. Double click on the layer name to rename it 'CharMesh'
7. In the second box on the layer, left click until it reads 'T', this puts the layer in template mode, you can see the mesh, but not select it

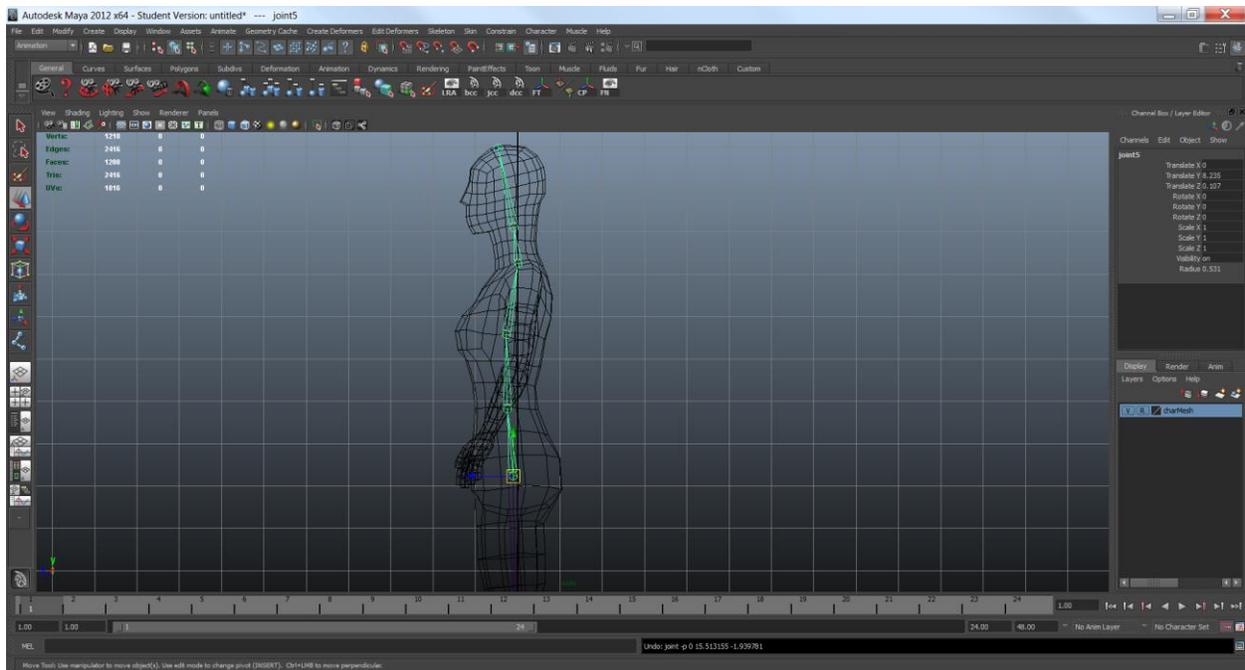




9. Use the space bar to go into your side view
10. Go to skeleton>joint tool
11. Starting at the top of the leg, begin clicking joints down the leg until you get to the toe
12. When you click on the toe joint, press the return key to complete the joint creation

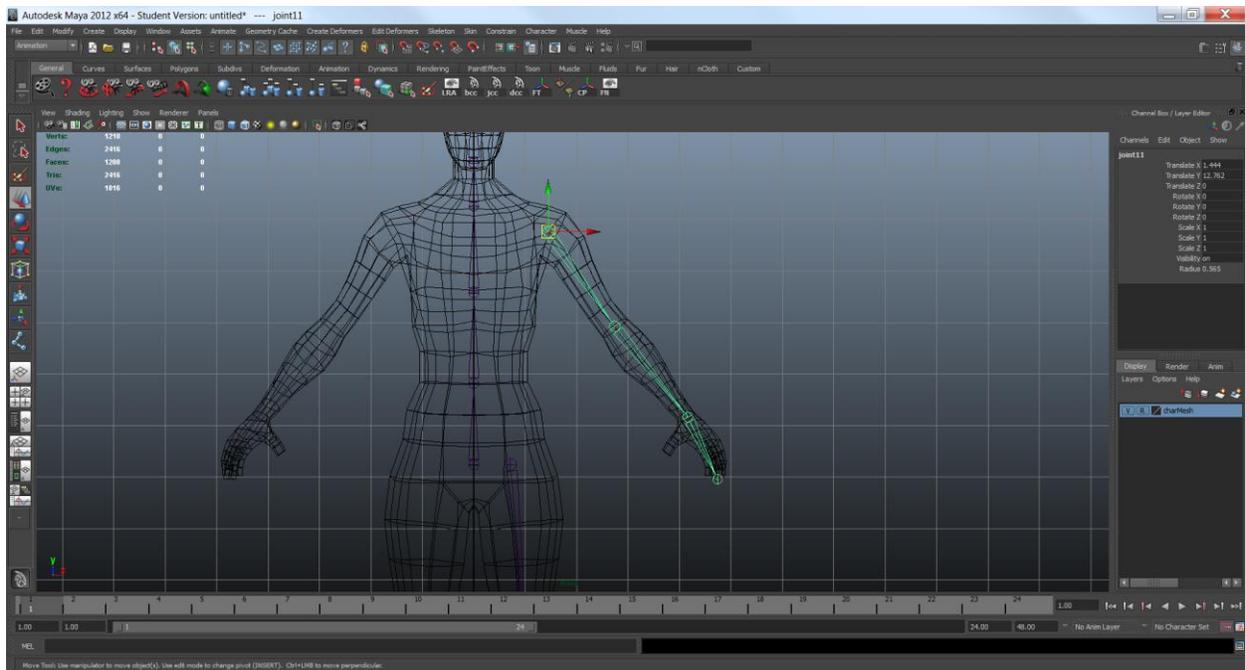


14. Go into the front view and use the move tool ('w' key) to move the top joint along the x-axis to the center of the leg as shown
15. Switch to the rotate tool ('e' key) rotate the leg along the z axis (the blue one) to get the knee and ankle into position
16. Select the ankle joint and do the same to get the toe joint to the center of the foot

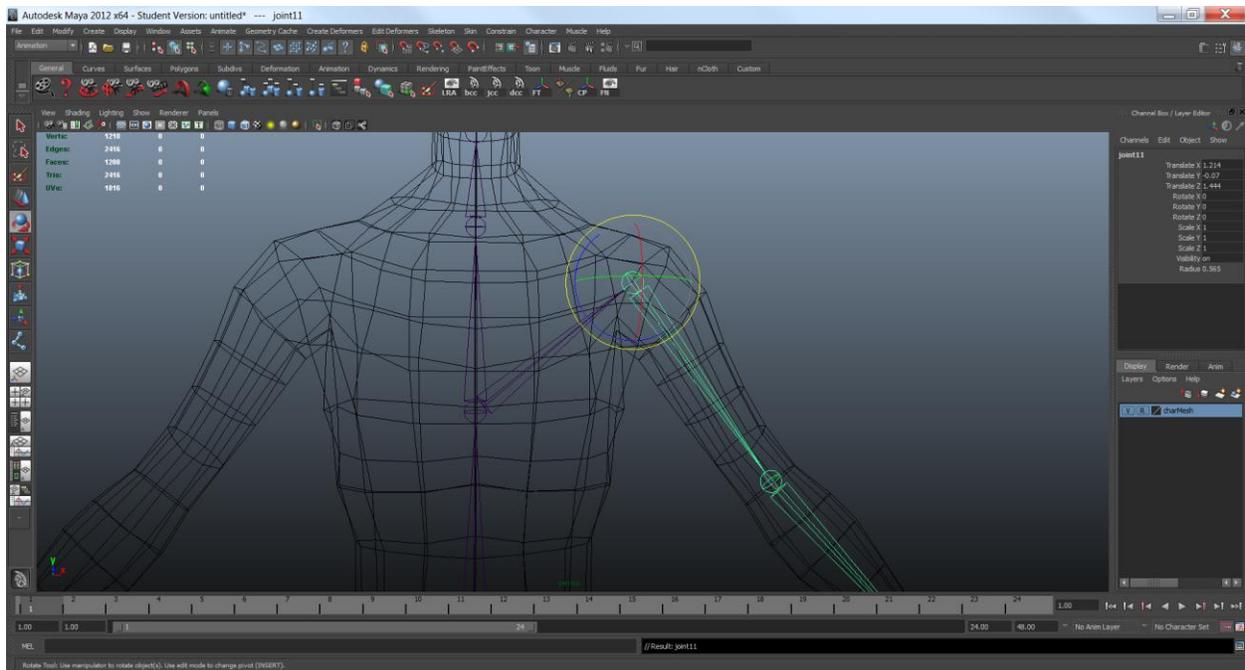


18. Go back into side view and reselect your joint tool

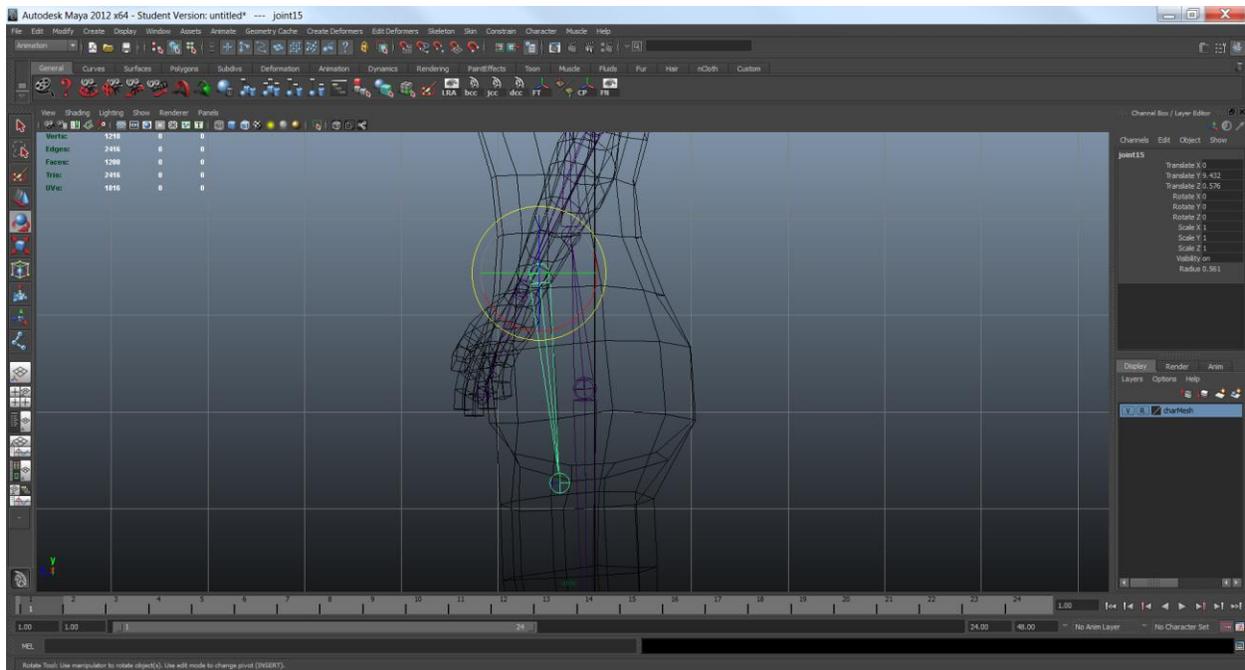
19. Draw out the joints as shown making sure not to accidentally click on any existing, you may find it easier to place the first joint by clicking on empty space and holding and dragging the joint into position



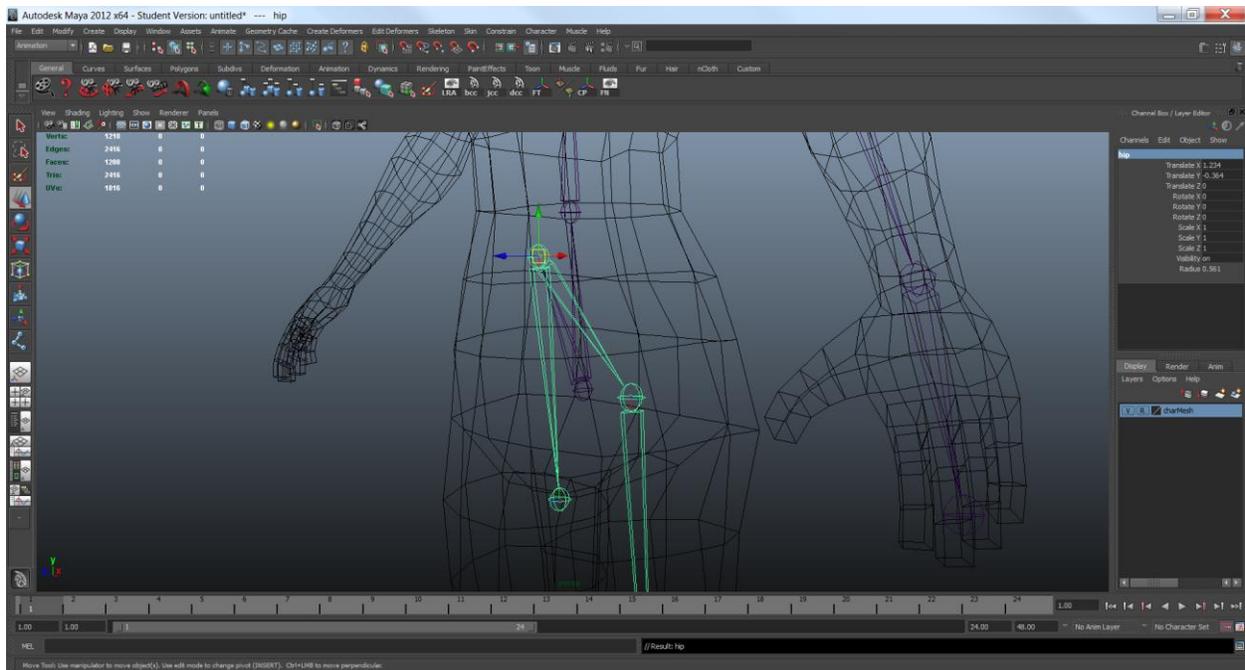
21. Switch to the front view and add new joints as shown above
22. Switch to the perspective view and rotate the joints until they get into the correct position at the center of the mesh, DO NOT USE THE MOVE TOOL, it will mess it all up!



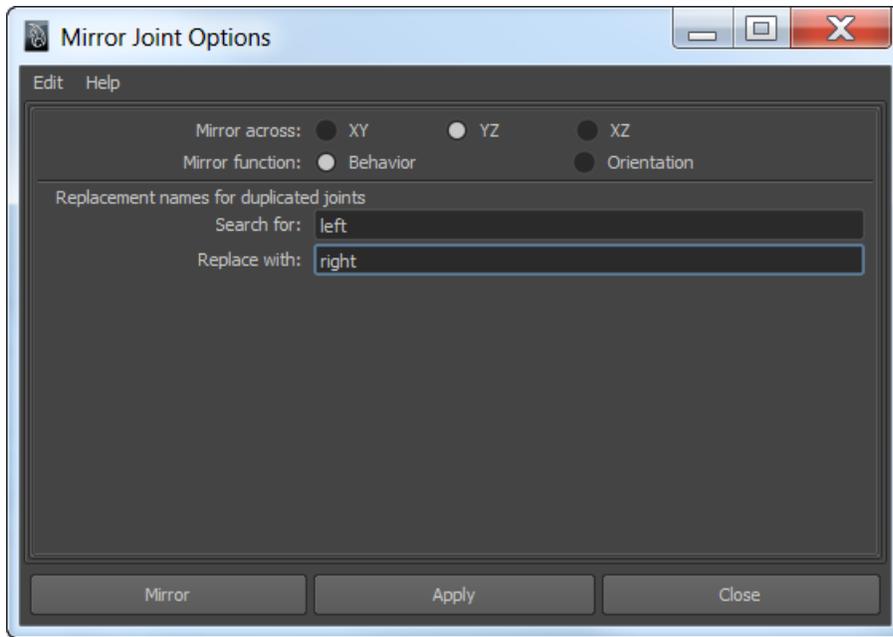
24. Parent the shoulder to the chest joint by first selecting the shoulder joint, then holding shift and selecting the chest joint. Once both joints are selected in this order press the 'p' key to parent the shoulder to the chest.



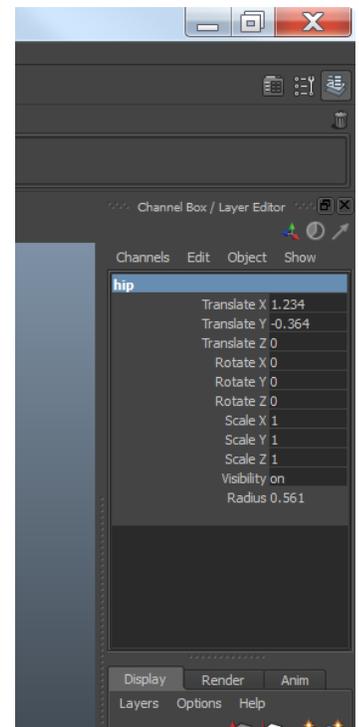
25. In the side view, create the hip joint by placing a new joint chain in front of the spine as shown.

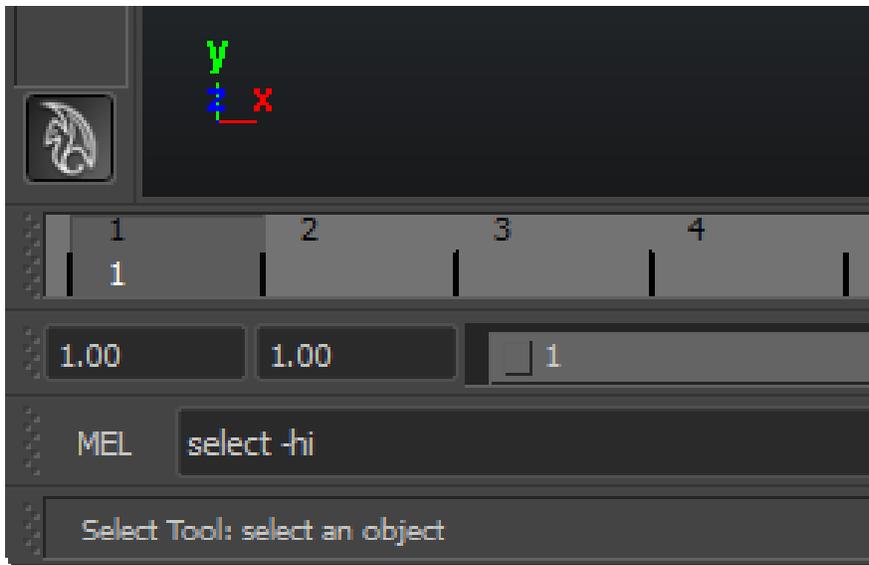


26. Connect it all together by selecting the top hip joint and then the root joint and hitting 'p' for parent
27. Click the top leg joint and then the same hip joint and parent this as well.

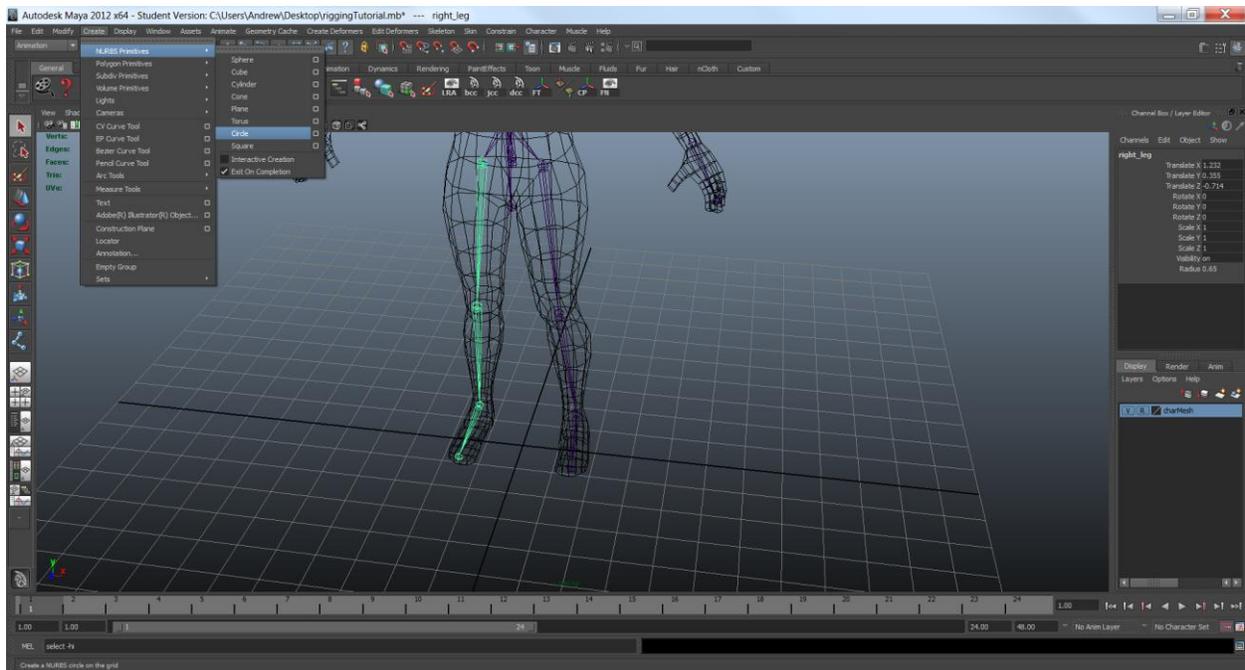


28. Go through the joints and rename them in the channel box (shown on the right). The convention I used was Root, hip, hipEnd, left_leg, left_knee, left_ankle, left_toe, spine, chest, neck, head, headEnd, left_shoulder, left_elbow, left_hand, left_handEnd.
29. Select the left shoulder and mirror it to the other side by going to skeleton>mirror joint and clicking the box next to it.
30. In the dialog box that appears choose 'Y' for you mirror across
31. The mirror tool can rename your newly created joints for you by putting 'left' in search for, and 'right' in replace with (this will only work if you used 'left' in the names of your joints)
32. Once you have mirrored your arm joints select the top leg joint and mirror that as well.
33. Congrats! Our skeleton is done!

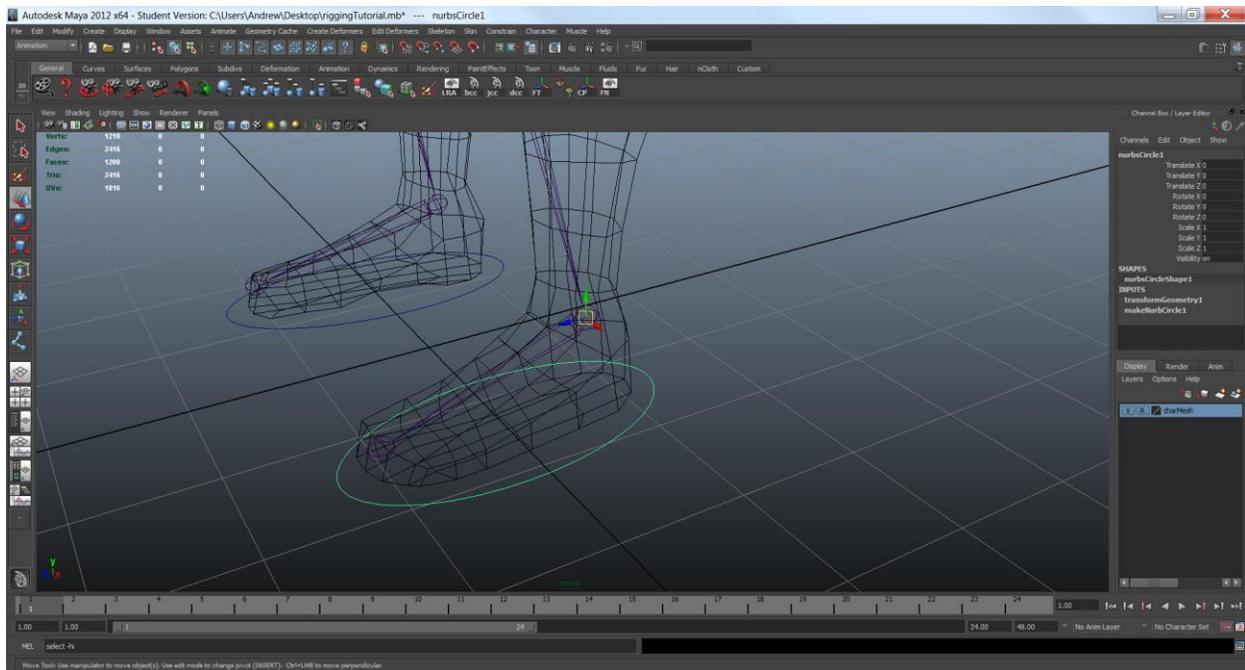




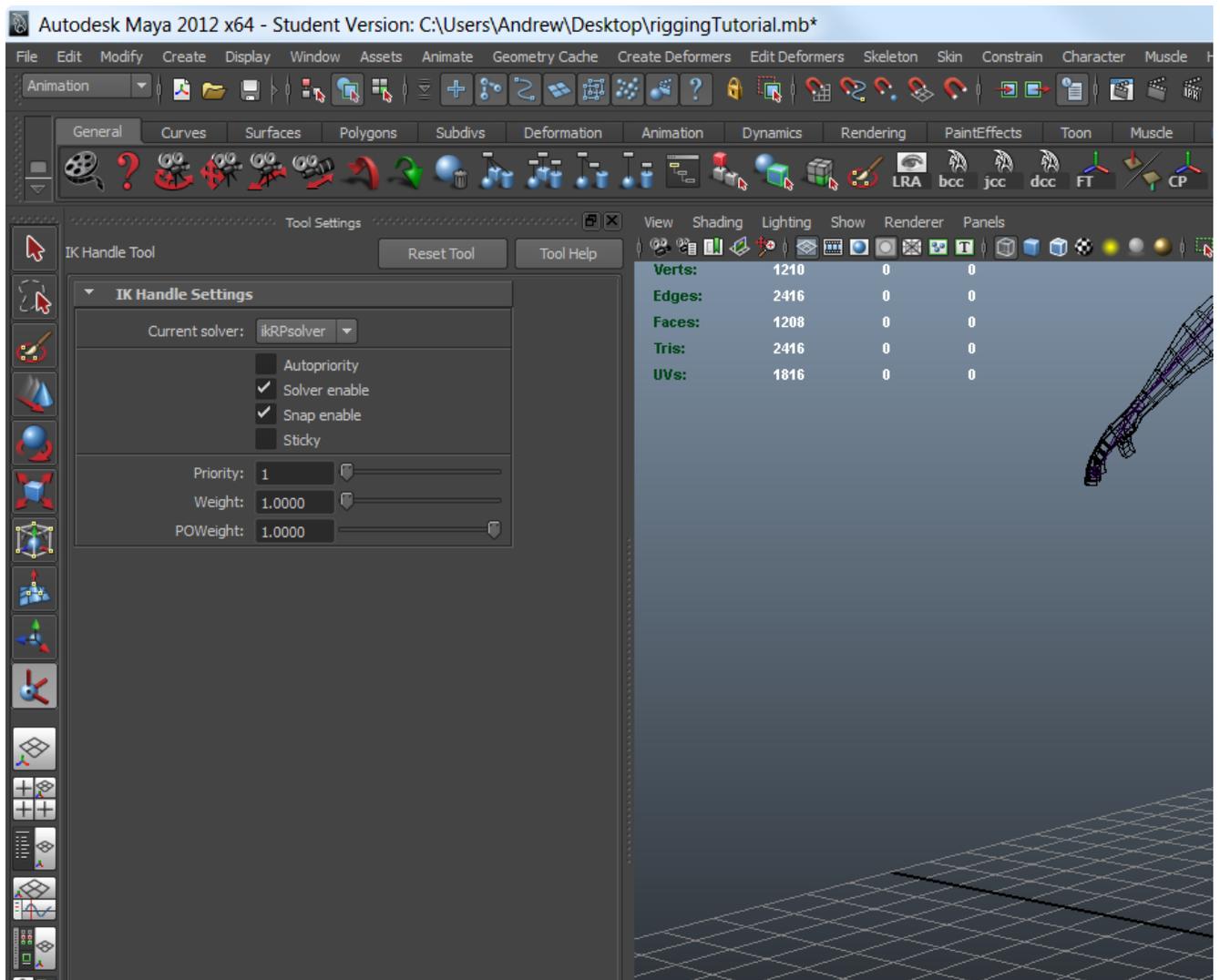
34. Prepare the skeleton for rigging by freezing all of the rotations. Select the root joint. At the bottom of your Maya screen you will find the 'MEL' script dialog. In there type 'select -hi'. This will select all of the joints in the skeleton at once.
35. Go to modify>Freeze Transformations.



36. You will be creating your controls with NURBS curves because they are easy to select and do not render in movies. Go to create NURBS primitives and make sure 'interactive creation' is unchecked. Click on 'circle' to create a NURBS circle at the origin of the grid.



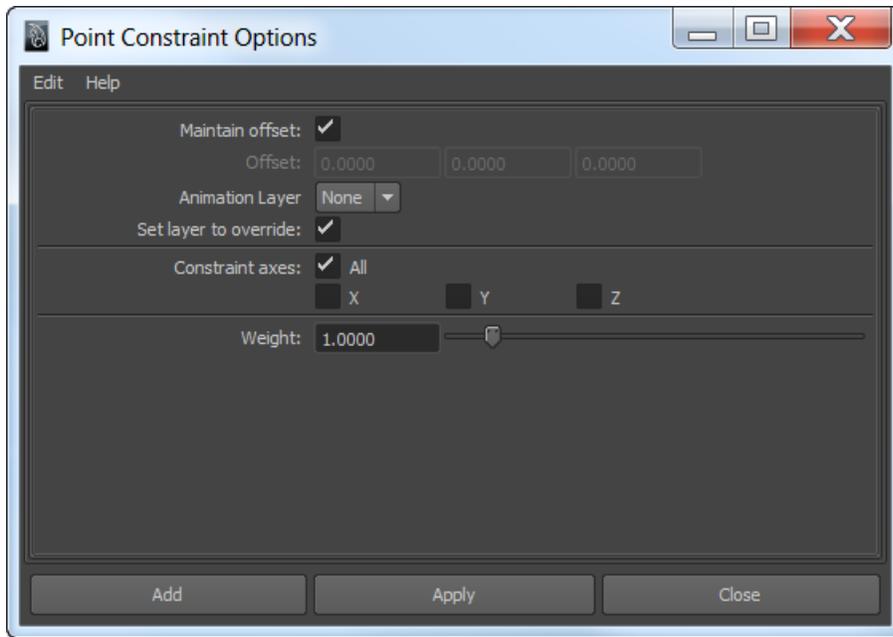
37. Select the new circle and move it under the ankle joint by holding the 'x' key and using the move tool along the red arrow (x axis)
38. Use the scale tool ('r' key) to turn the circle into an oval that wraps around the foot
39. Move the circle's pivot point to the ankle by holding the 'd' and 'v' keys and using the move tool to place it directly on the ankle joint
40. Duplicate the foot control using 'shift' and 'd' and drag the duplicate under the right foot.
41. Freeze the transformations of both controls and name them 'left' and 'right' 'footControl'



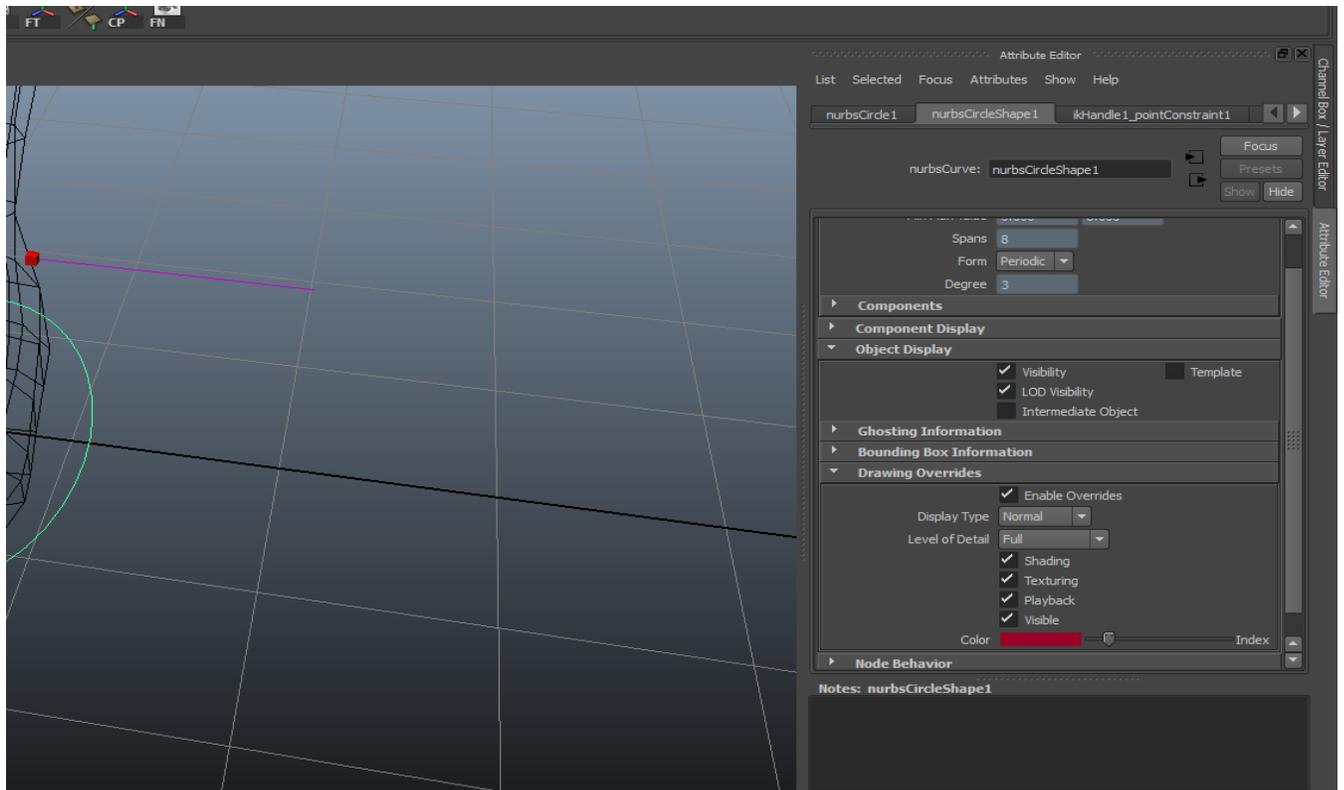
43. We are now going to turn the leg into an IK joint chain, we do this by going to skeleton > IK handle tool and clicking the box next to it.

44. Set 'current solver' to 'ikRPsolver'

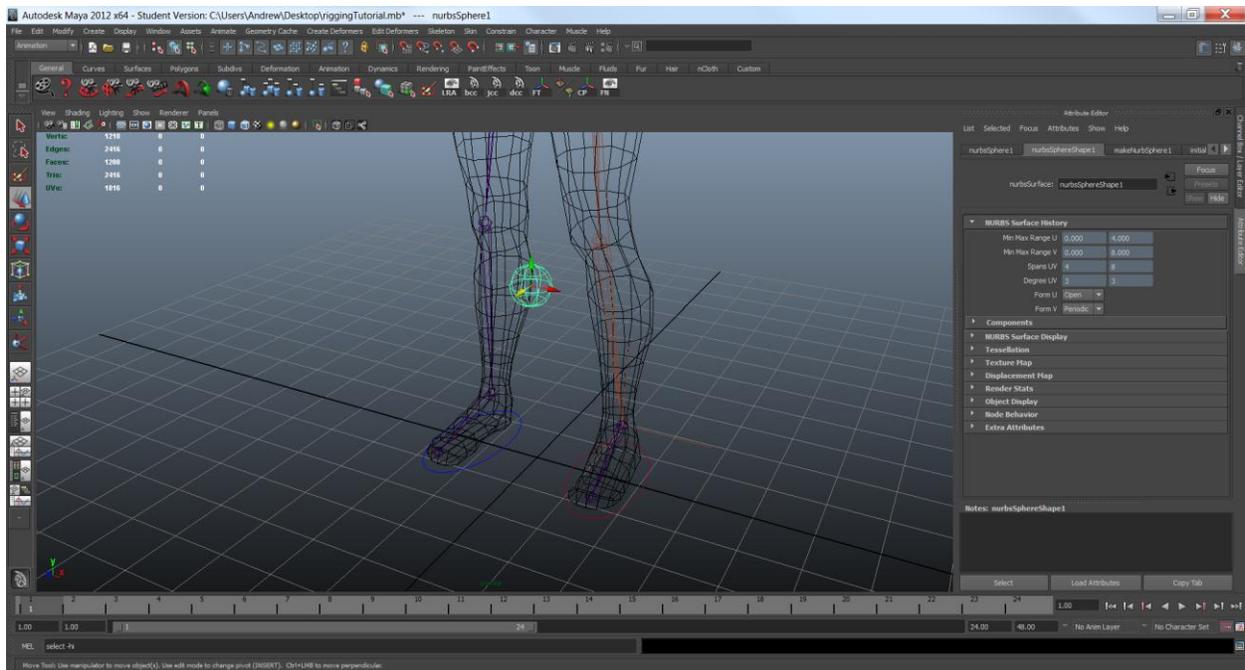
45. The mouse pointer will turn into crosshairs, click first on the top leg joint, then on the ankle. This will create the IK handle



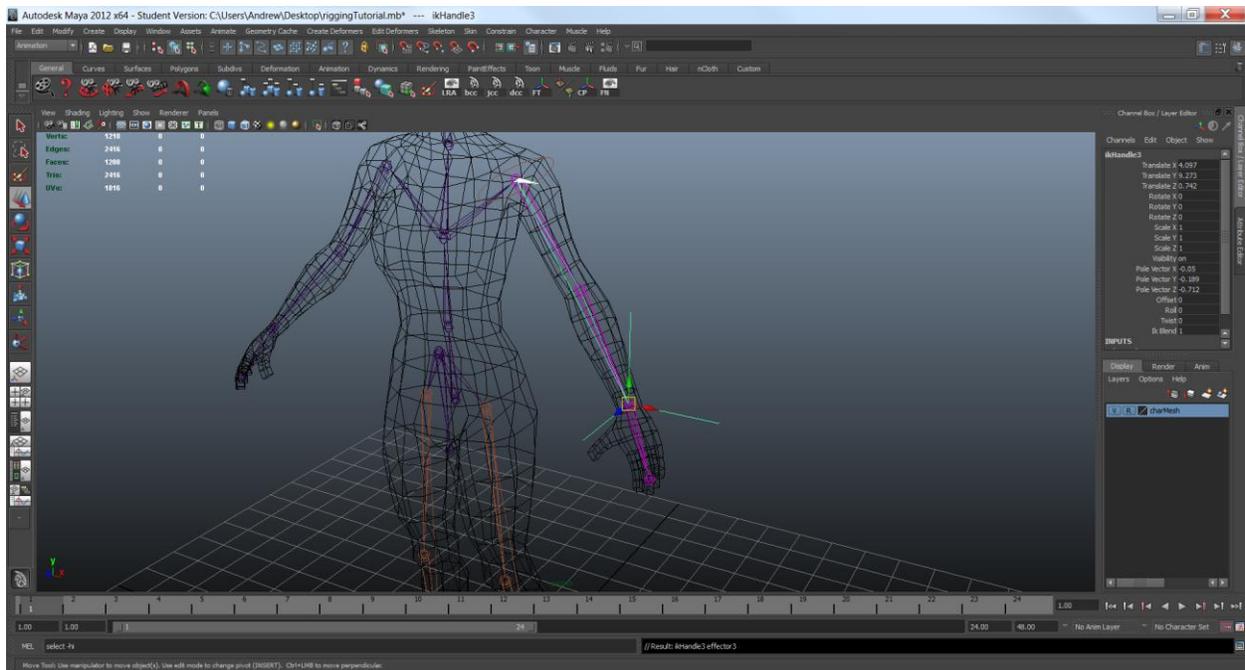
46. Tie the foot controller to the IK handle by selecting the control, then shift selecting the IK handle (the lines coming out of the ankle)
47. Apply a point constrain by going to constrain>point constrain and clicking on the box
48. In the dialog click 'maintain offset' and press 'add'
49. In order to control the rotation of the ankle from the foot control as well, select the foot control then shift selecting the ankle joint.
50. Go to constrain>orient constrain and clicking the box, there check 'maintain offset' on and press 'add'



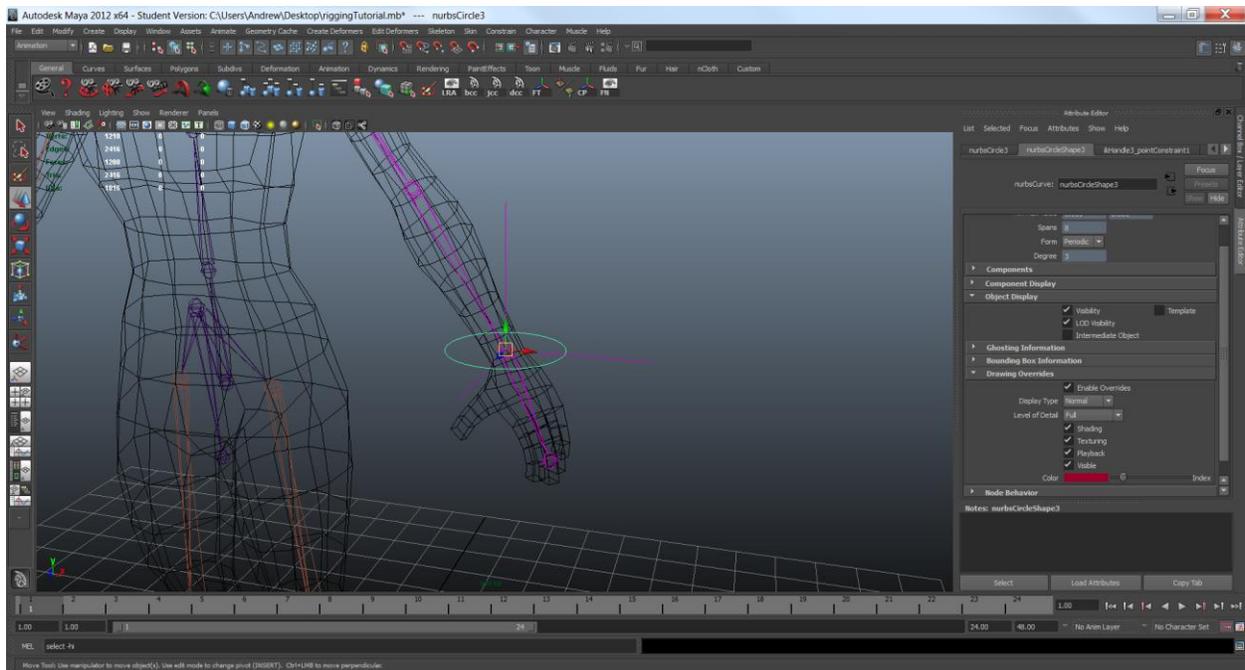
51. We can make the controls easier to identify by changing their color. Do this by selecting a control and going to the 'attribute' tab (you can open it by clicking the icon in the upper right or pressing 'ctrl' and 'a')
52. Once there find the 'object display' tab and open it, open the 'drawing overrides' tab and click 'enable overrides'
53. Down at the bottom you can select the color by dragging the slider left and right. I usually use red for the left side and blue for the right, I use yellow for things in the center.



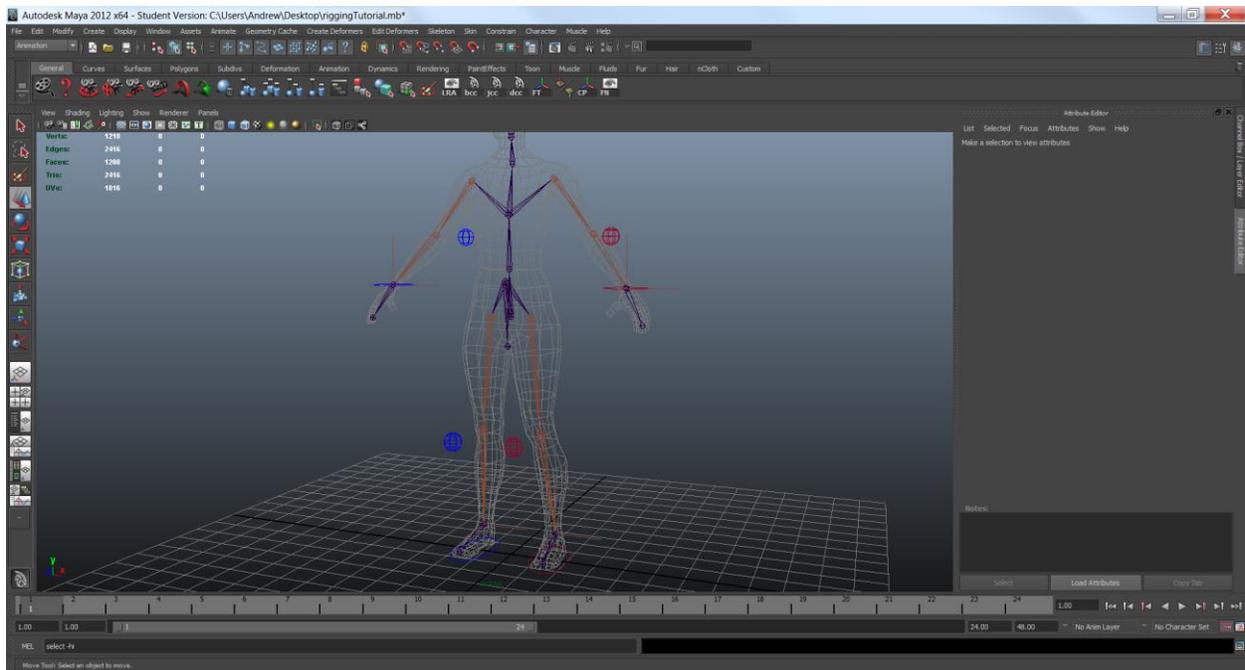
54. Create a control for the knee by creating a NURBS sphere (create>NURBS Primitive>Sphere) and scale it down to a smaller size
55. Use the move tool while holding 'v' to snap the sphere to the knee. Duplicate the sphere and snap the copy to the other knee, then drag them both straight out in front of the character on the z axis.
56. Rename the spheres, freeze transforms, and change their colors.
57. Select the sphere, then shift select the leg IK handle on the ankle
58. Create a pole constraint by going to constraints> pole vector. This will let us use the knee control to adjust the direction of the knee
59. Repeat steps 43-58 on the other side



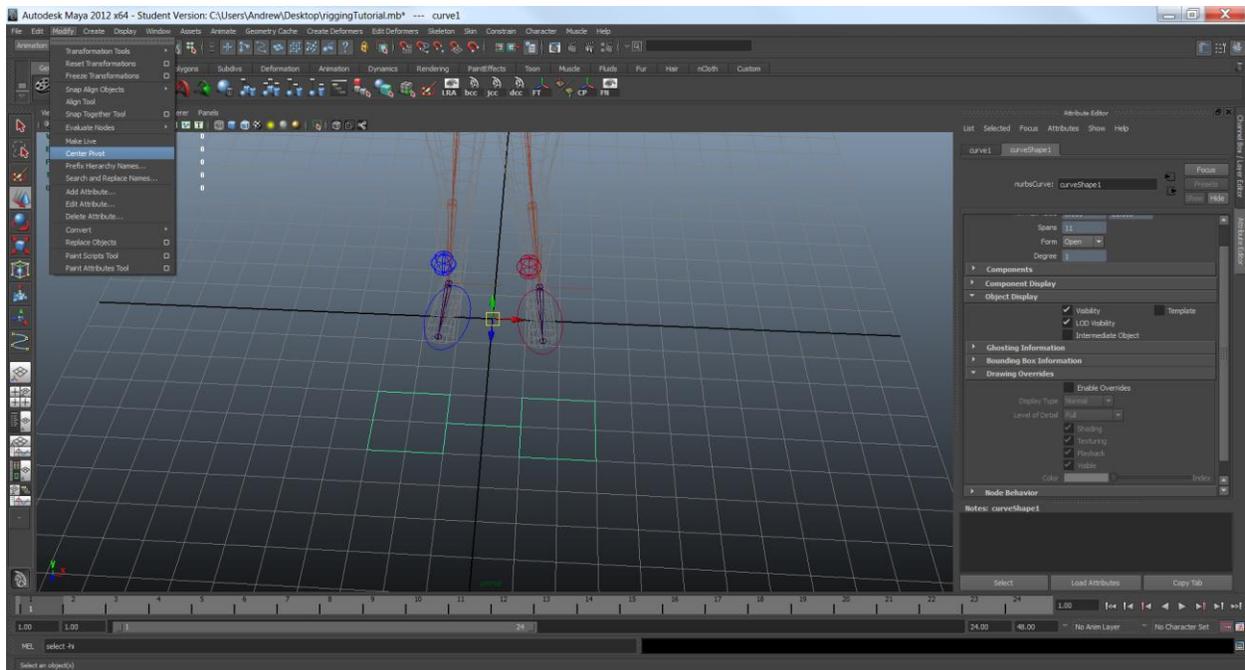
61. Use the IK handle tool to create an IK on the arm as well (starting from the shoulder and going down to the wrist)
62. Repeat on the other side



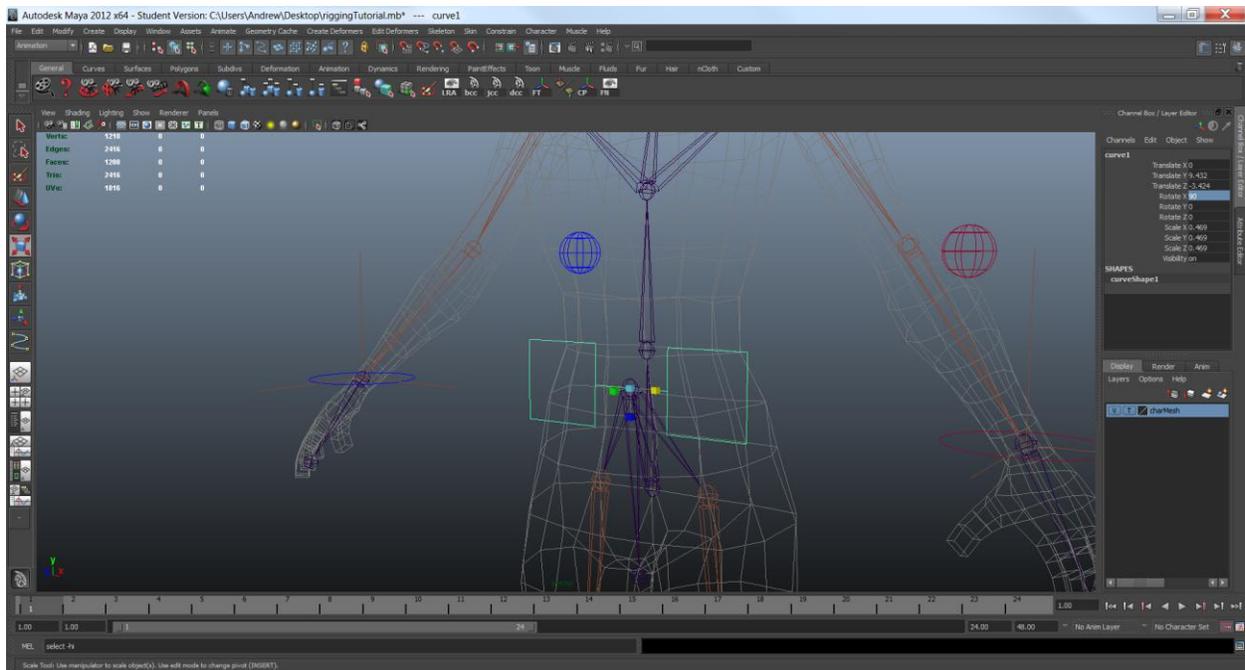
63. Create another circle, snap it to the wrist and freeze it's transformation
64. Apply a point and orient constraint like we did on the leg
65. Finish by renaming and recoloring the control
66. Create elbow joints with pole vector constraints the same way you did the knees
67. Do the same for the other side



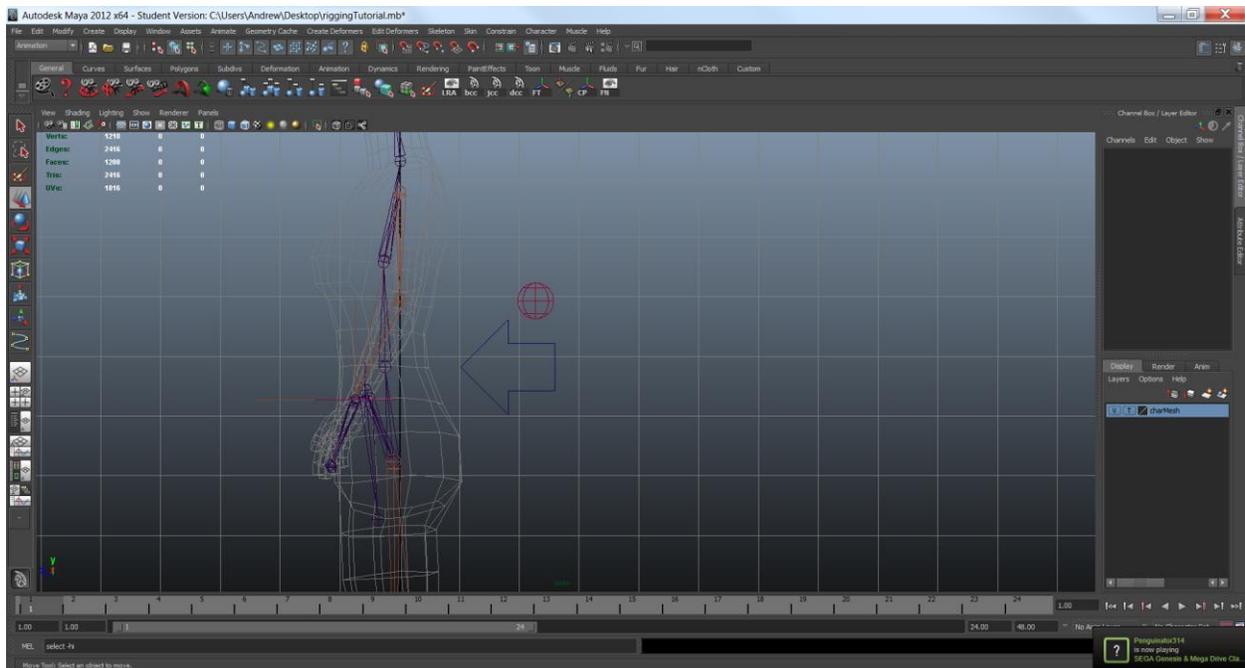
68. At this stage your rig should look like this.



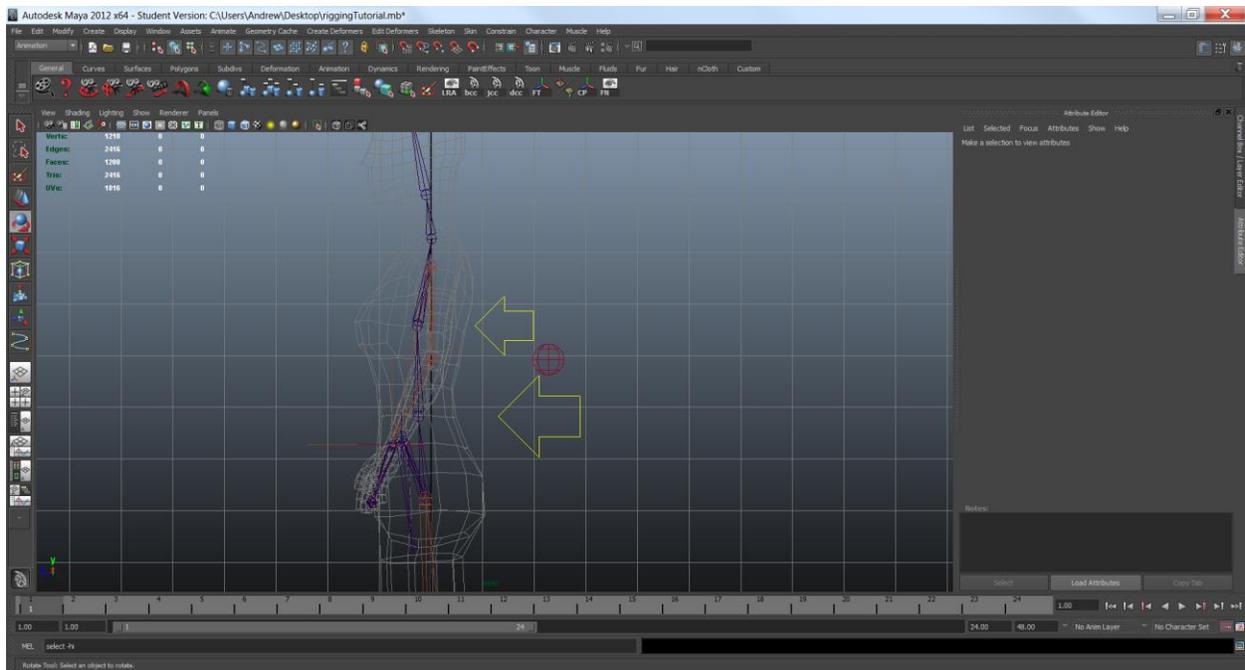
69. Create a hip controller by using the CV tool found in create>CV Curve Tool. Create the shape below by holding 'x' and clicking on the grid as shown below.
70. Center the pivot of the newly create object by going to modify>center pivot



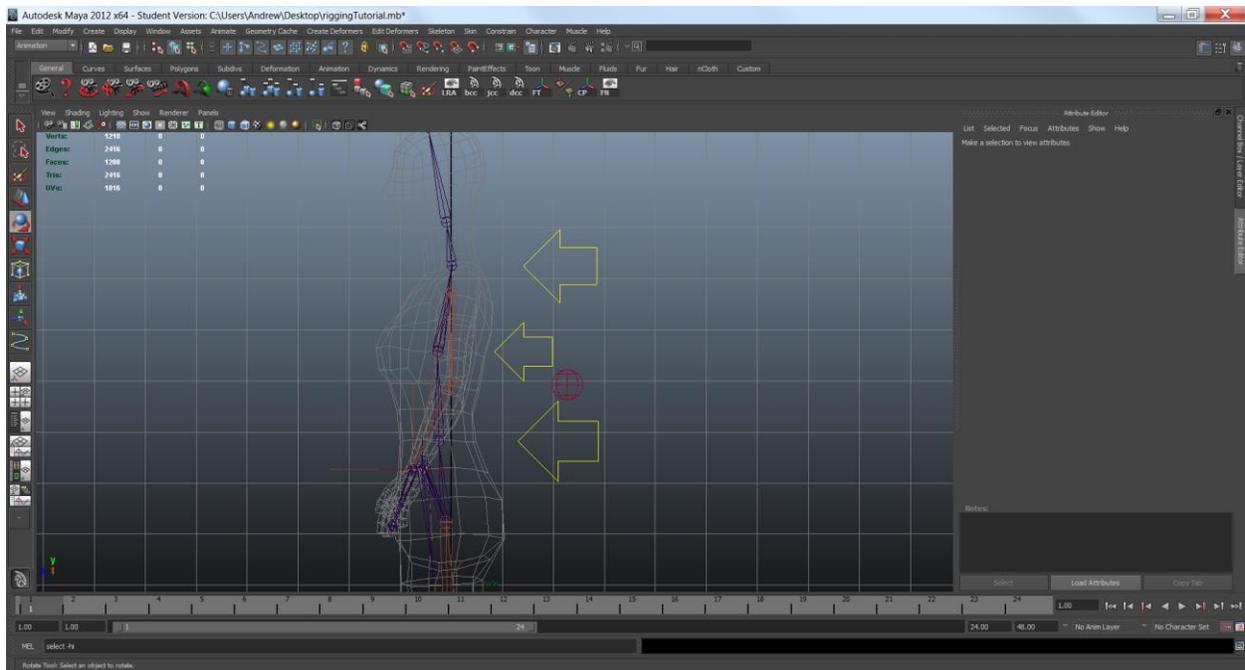
71. Rotate the new control 90 degrees in the x axis and snap it to the hip joint (by using the move tool while holding 'v')
72. Scale up or down as needed
73. Freeze transform, change color, and rename "hip control"
74. Select the control, then shift select the hip joint and add an orient constraint



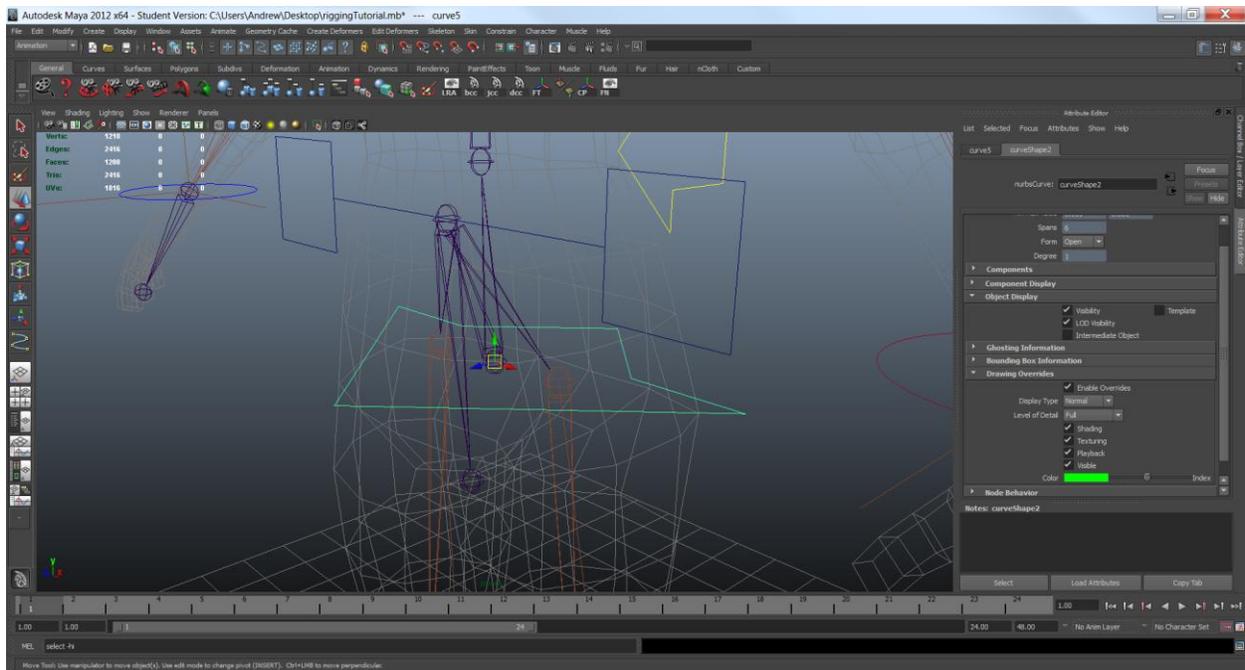
76. In the side view, use the CV curve tool to draw out an arrow shape.
77. Point the arrow at the spine joint at the small of the character back and move snap the pivot onto that joint (by holding 'd' and 'v')
78. Freeze the control's transform, change the color (yellow), and rename "backControl"
79. Select the control, shift select the joint and apply an orient constraint



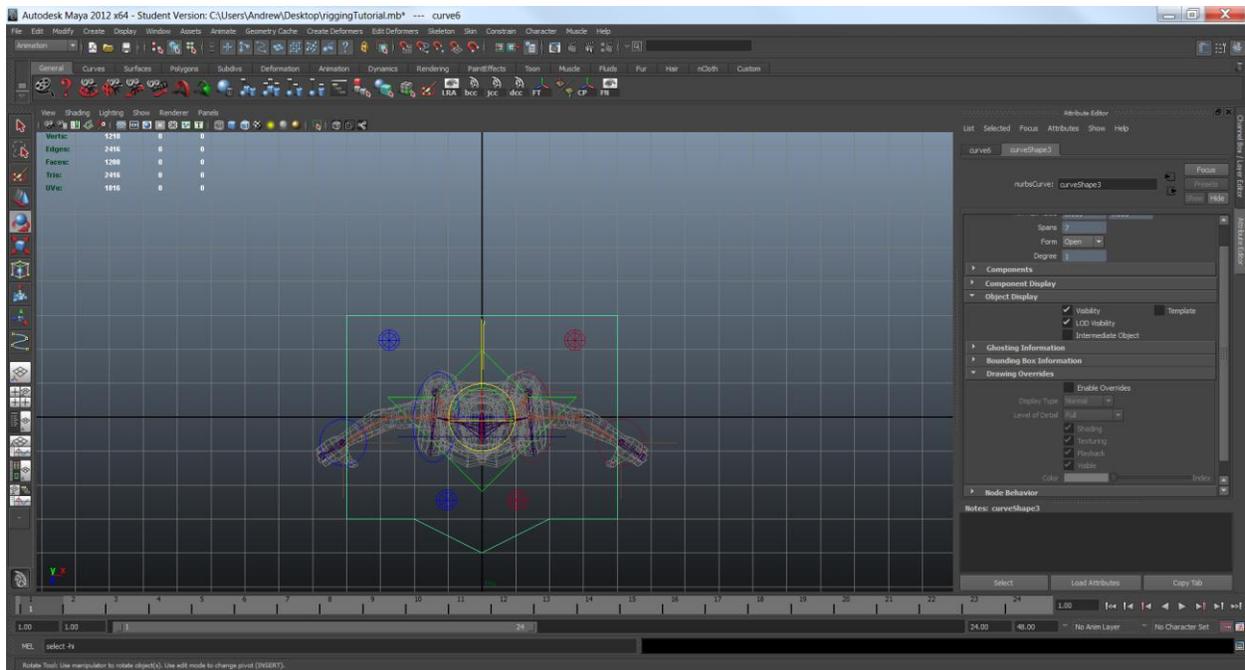
80. Duplicate the arrow and move it's pivot onto the next joint up (chest)
81. Resize the control, rename "chest control", and freeze transform
82. Apply an orient constrain on the chest joint for the chest control arrow
83. Select the chest control, then shift select the back control and press 'p' to parent. This will keep all of our controls in line when we begin to rotate things



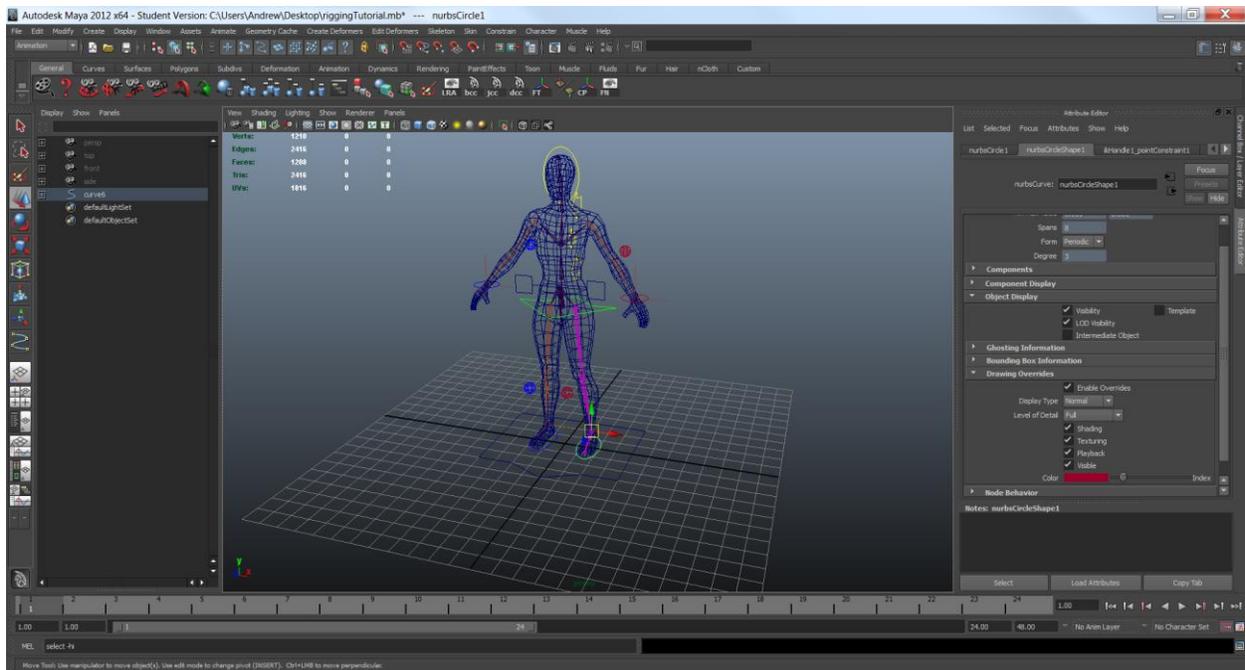
85. Create another duplicate of the arrow and move this one up to the neck joint.
86. Freeze transforms, rename 'neckControl', and orient constrain
87. Select the new neck control and shift select the chest control, press 'p' to parent
88. Finish the spine rig by creating a new circle and snapping it to the head. Position it, scale it, move the pivot to the head joint, freeze transform, rename "headControl", recolor, and apply an orient constraint to the head joint (you know the drill by now, refer to the earlier sections if confused), lastly parent the head to the neck control (choose head first, then neck, p for parent)



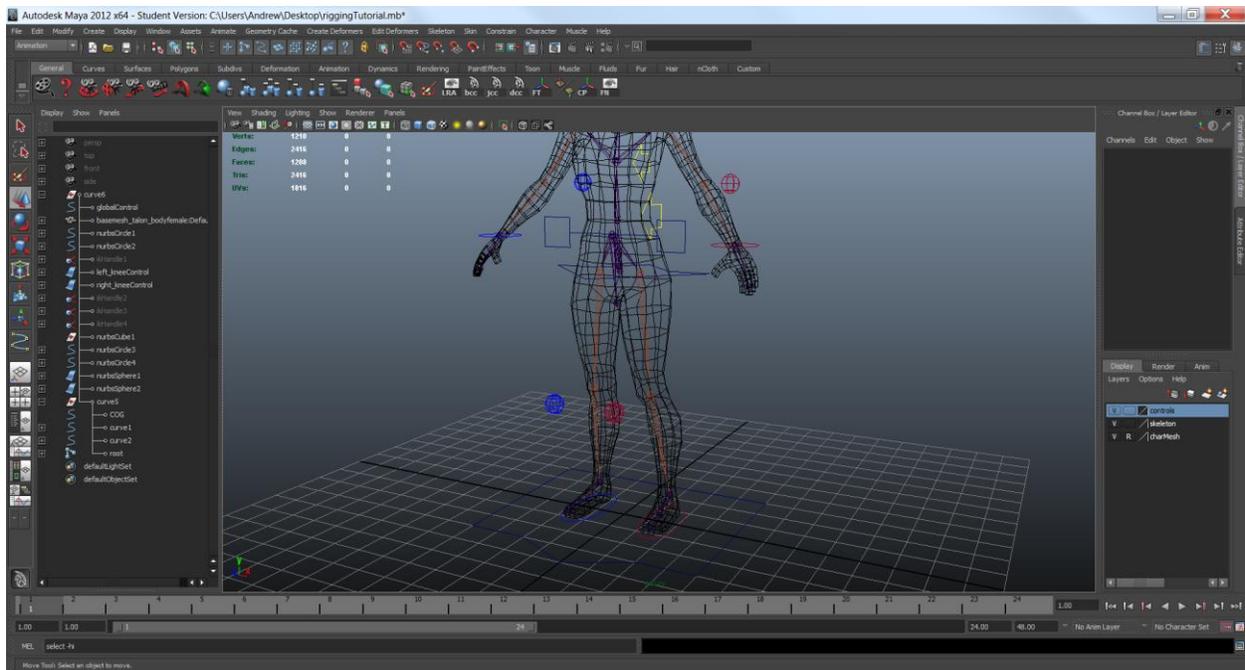
89. Create a center of gravity control by tracing out a pattern like so using the CV curve tool and grid snapping ('x' key)
90. Center the pivot on the new control and snap it to the root
91. Freeze transform, rename "COG", recolor
92. Select the root joint, then shift select the COG and press 'p' to parent them
93. Then Select the hip and back controls and shift select the COG, press 'p' to parent



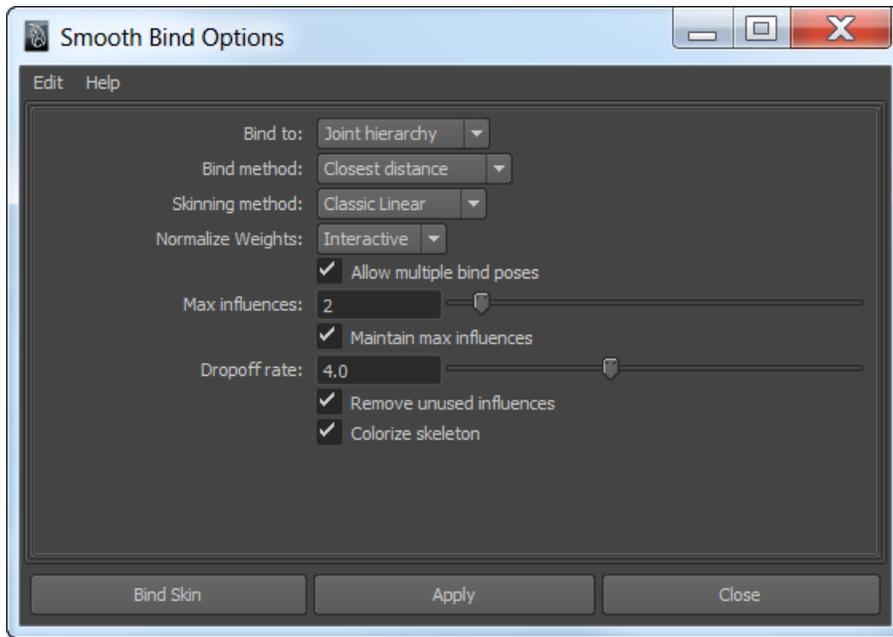
94. Create a global control with the CV curve tool as shown
95. Freeze transform, rename, and recolor
96. Select all of your controls (except the new global control)
97. Now shift select the global control and press 'p' to parent all of them
98. This will let you move the whole character at once!



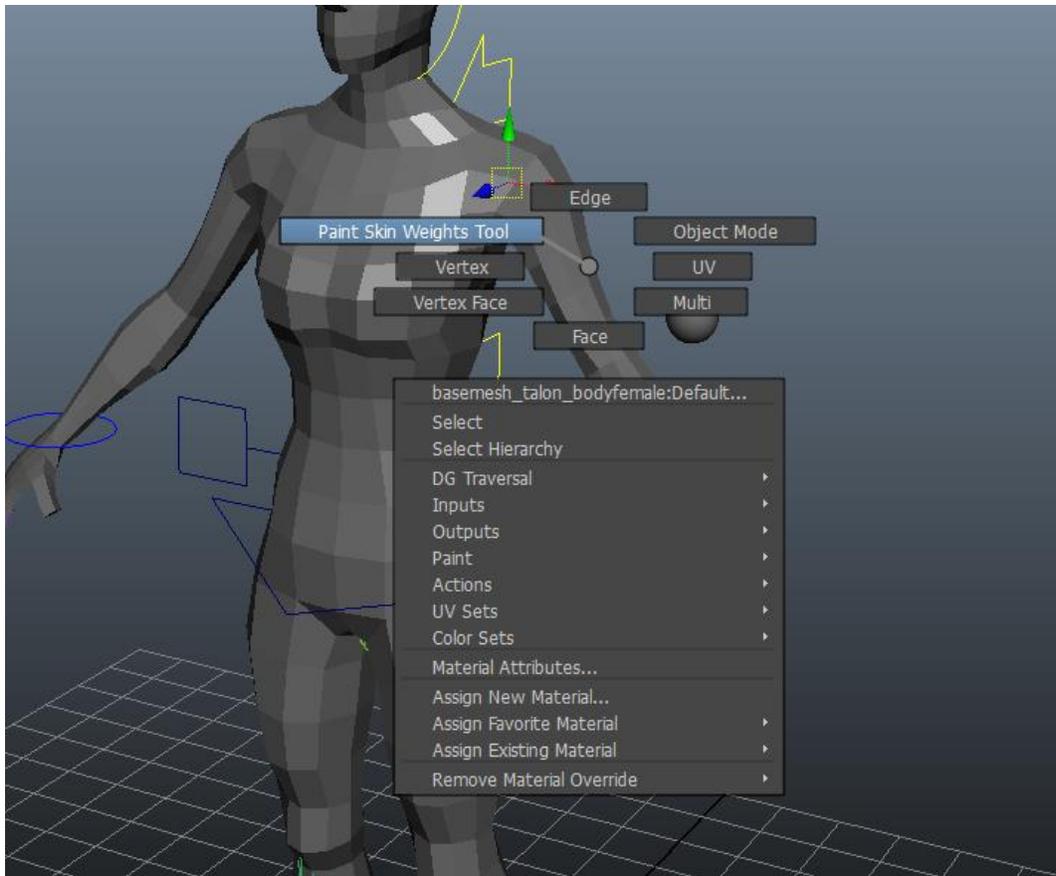
99. Congratulations! Assuming your rig looks something like this your rig is done! But the fun is just beginning!



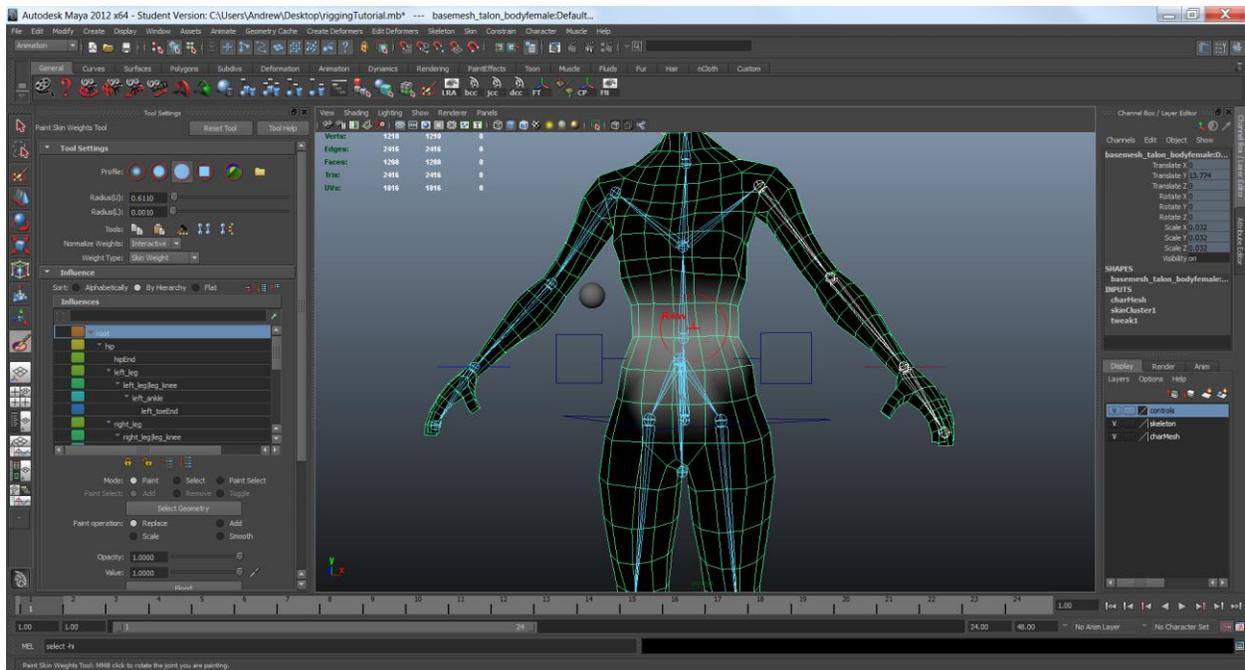
100. Clean up your scene by placing everything in different layers.
101. Select the root joint and create a new 'skeleton layer'
102. Make sure your mesh is ready for binding by untemplating the mesh (click the 'T' on the layer tab until the space is blank)
103. Select the mesh and freeze the transform and delete the history by going to edit>delete by type>history



105. Select the root joint and shift select the mesh
106. Go to skin>bind skin>smooth bind and click the box
107. In the dialog options change "max influences" to '2'
108. Click 'bind skin'



109. Hold down the right mouse button on the mesh and choose 'paint skin weights'



110. We are now on the last step before animating, weight painting
111. By dragging our mouse while holding the left mouse button we can paint influences for each joint onto different vertices. Holding ctrl while doing this will invert the action (removing influence instead of adding it)
112. Holding the 'b' key and dragging will let you change your brush size. Holding shift while dragging will smooth out your influences
113. Select your joints from the left panel and paint your weights onto the vertices
114. Pure white means 100% influence, black means 0% influence
115. The root joint should not have any influences
116. Paint all of your influences in between joints in the direction of the triangles
117. Repeat, for success, play around with it till the character move satisfactorily.
118. Done!

Love Andrew