

CS125: Introduction to 3D Computer Animation  
Fall 2009  
Prof. Barbara Meier

## Modeling Assignment

Date	What should be done	Handin name	Files to handin
Sept 30, 10am	Poly helmet and unc tutorial	poly_tut	<ul style="list-style-type: none"><li>○ &lt;login&gt;_helmet.mb</li><li>○ &lt;login&gt;_unc.mb</li><li>○ REPORT.txt</li></ul>
Sept 30	Bring reference object to class		
Oct 2, 10pm FRIDAY	Subdivision tutorials	subd_tut	<ul style="list-style-type: none"><li>○ &lt;login&gt;_starfish.mb</li><li>○ &lt;login&gt;_subdunc.mb</li><li>○ REPORT.txt</li></ul>
Oct 2, 10pm FRIDAY	NURBS tutorials	nurbs_tut	<ul style="list-style-type: none"><li>○ &lt;login&gt;_egg.mb</li><li>○ &lt;login&gt;_salt.mb</li><li>○ REPORT.txt</li></ul>
Oct 7, 10am	Progress model	model_progress	<ul style="list-style-type: none"><li>○ &lt;login&gt;_model_progress.mb</li><li>○ REPORT.txt</li></ul>
Oct 14, 10am	Final model	model_final	<ul style="list-style-type: none"><li>○ &lt;login&gt;_model_final.mb</li><li>○ REPORT.txt</li></ul>

### Goals and introduction

*Don't be too timid and squeamish about your actions. All life is an experiment. The more experiments you make the better.* – Ralph Waldo Emerson

The goal of this assignment is to learn how to create geometric models in Maya. In particular, you will learn about different methods available in Maya and learn how to determine good workflows for creating particular objects. The process of modeling is making a series of decisions about how to proceed. Our goal is for you to become adept at making these decisions.

### Polygonal modeling tutorial

1. Read *Introducing Maya 2009* Chapter 4 through p. 121 (stop at the hand tutorial).
2. In *Getting Started with Maya*, do the Polygonal modeling lesson. The source images are in `/course/cs125/asgn/PolygonModeling/sourceimages/`. Save your helmet to hand in.

3. Read *Introducing Maya 2009* pp 128-136 for general concepts in poly modeling. The idea here is to find out what kinds of operations you can do. When you actually need to use one of these, you will use the book or Maya help to guide you through the actual steps. Glance through the Steam Locomotive tutorial and be glad you aren't doing it.
4. Do the polygon unary calculator tutorial on the CS125 Google website (don't do the subdivision one yet). We will be sharing a link with you so you can access this tutorial. Read through all the information and build your own calculator. It should have the same features as the one that we show you, but doesn't have to be exactly the same. Save your model to hand in.

### **Subdivision modeling tutorial**

1. Read *Introducing Maya 2009* p. 203.
2. Do the Starfish tutorial, pp 204-208.
3. Look through the teakettle tutorial and read the end pages of the chapter.
4. Do the subd unary calculator tutorial on the CS125 Google website . Save your model to hand in.

### **NURBS modeling tutorial**

1. Read *Introducing Maya 2009* Chapter 5 through p. 174. Read pp 193-200.
2. In *Getting Started with Maya*, do Lesson 1: Revolving a curve to create a surface and Lesson 3: Lofting curves to create a surface, both under NURBS modeling.
3. On the cs125 google website, do the NURBS banana tutorial. Save your banana to hand in.

### **Reference object to model**

Bring to class a physical object (not a drawing!) that you would like to model in Maya. It should be more complex than a mug or wineglass, but not something with many, many parts. For example, you will not have time to make a realistic-looking car, but you could model either a realistic-looking hubcap, or a very simple single surface toy car. Some past objects have included a flashlight, a game controller, scissors, Hello Kitty, and a guitar (this is quite challenging). In later assignments, you will be designing surface properties or shaders for the object, so choose something you want to work with for several weeks.

If you choose something that you think is very ambitious or very simple, bring in a backup object. We recommend that you don't attempt to create a character that you want to animate later, because the topology of a character model must be done correctly in order to bind the model to a rig later. The rig is the animatable skeleton inside the model. It is best if you get more practice modeling before you have to be concerned with topology (how the polygons are spaced and connected to each other).

During class, we can help you judge whether your choice is doable. Think about what approach you might use when you create your model. You will share your object and approach in class.

## **In Class Labs**

We will be doing several in-class modeling labs to help solidify the concepts learned in the tutorials in a supported environment. The main purpose of the in-class labs is to help you learn how to choose an approach and a workflow for a particular model. It is very important to keep up with the tutorials so your in-class lab time will not be wasted.

## **Creating the model**

In this part of the assignment, you will model the object you brought to class. We will not be critiquing the final handins in class, but will be looking at your models again during the next assignment in which you will assign shaders to the models.

Toward the end of this project, you will learn how to assign UV coordinates to your model for texture mapping. You do not have to finish the uv-mapping for this assignment. It will be a requirement for the next one which is shading.

## **Design criteria – what we are looking for**

These are discussed in more detail in the unary calculator modeling tutorial.

- **Representational.** The model should be an accurate representation of the object. It should have the same scale and proportion as the real object. This is not hard to achieve if you use scanned photos or scale drawings as reference in Maya.
- **Lightweight.** The model should have an appropriate amount of geometry for the complexity of the object, i.e just enough polygons or patches to show the details and no more.
- **Rounded or beveled edges.** The edges should be rounded where appropriate.
- **Single shells.** Each surface should be one shell without parts intersecting. There are places where it is okay to intersect, especially where they won't show, e.g. the legs on a sofa could intersect the body because we would not typically look at the bottom. Discuss this with a TA if it is confusing.

- **Quad polys and good edge flow**

### **Tips**

- *Get started early* so that you will have plenty of time to talk to the TAs about possible approaches or problems you may be having. The hardest part of modeling can be choosing an initial method and/or geometric primitive to work from. Many students get to a certain point in making their model and find that it is easier to start over than fix what they have. *This is a valid modeling technique and is used from novices to professionals!*
- Think about how you will build your model before you start. You may photograph or make scale drawings of orthographic views (top, side, front) of the object and import them into the camera image planes.
- Don't delete work history until you are certain that your model is the way you want it. Do save your work often. It is common to select the wrong polygons or CVs, transform them, and then see that you have really screwed up your model. You need to be able to undo or revert to an earlier version. Maya undo doesn't always work like you think it should.
- When using smooth, make sure it is a step that must be done before going on to another modeling step, otherwise just use smooth preview ("3"). If you need to do a smooth at the very end, be sure to keep an unsmoothed version as well. An unsmoothed model is much easier to map with UVs (the first step in shading) and to animate.
- Try to use real world units (inches or centimeters for the size objects you are modeling) so that models can be used together in scenes in the future without excessive scaling.
- To make single shell poly models, use extrude to add pieces to your model. Alternatively, you can make the pieces separately and then use Edit Mesh>Bridge or Merge to connect the pieces. As a very last resort, you could try Boolean operations (Mesh>Booleans). The Booleans often mess up the topology.

### **Technical requirements**

- Hand in an uncluttered scene. Make sure your object pieces are grouped under a single node (Edit>Group) so that we can tumble it around in class. Place your object more or less centered about the origin and nearly filling the perspective view before you save so that we don't have to hunt through your scene for it.