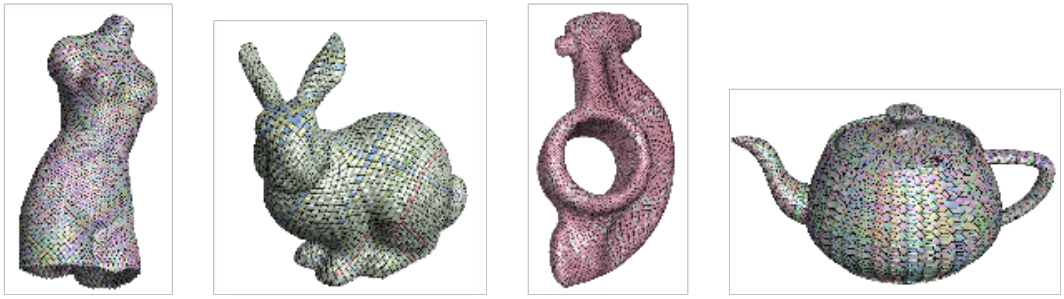
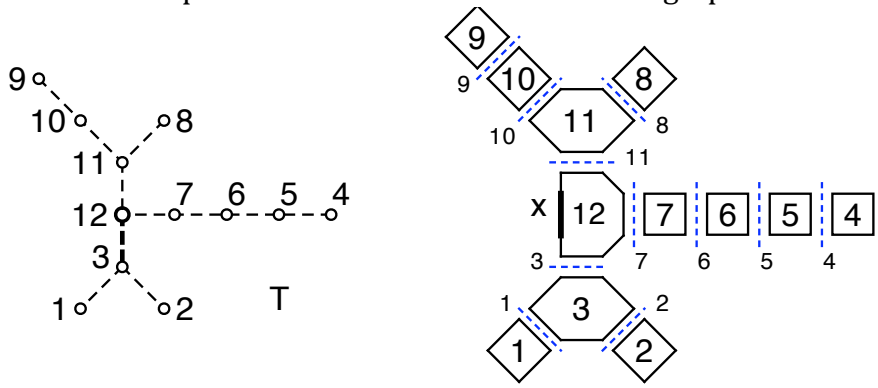
COMS 6204 Topics in Graph Theory
starts 4:10pm Monday 25 January 2010
Professor Jonathan Gross

This course surveys a number of interesting topics in topological and algebraic graph theory. Some of the topics reflect my recent research focus on topics arising in computer graphics. Here a few of the topics.

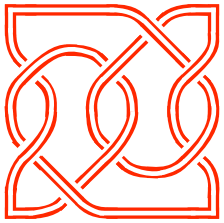
• **Computer graphics models for woven images.** At SIGGRAPH 2009, two colleagues and I presented a paper on using what topological graph theorists call extended rotation systems as a model for constructing woven spatial images. This model was used to construct the images just below.



• **Algorithms for calculating the number of topologically different possible drawings of certain graphs on various surfaces.** This figure illustrates an algorithm that uses the post-order of a tree in the dual of a graph.



• Celtic knots. A mathematical representation of Celtic knots (a graphic art form) enables us to derive some interesting properties of Celtic knots and also to a new framework for studying all kinds of knots and links.



The course has lots of pictures and drawings. Any course I teach has lots of side-comments. The following comments were taken down (anonymously) in a class I taught last semester and posted on a website.

“When I say a baby-level proof, that's just how mathematicians talk. I don't actually know any babies that can do algebraic topology.”
Jonathan Gross in Discrete Mathematics (COMS W3203) on 2009-12-09

“If you ever encounter a textbook [on this topic] that doesn't count the exterior face of a graph, burn it. Then, capture the author and burn him too.”
Jonathan Gross in Discrete Mathematics (COMS W3203) on 2009-11-30

“When you don't know what I'm doing [in lecture], you can be pretty sure it's self-parody. I'm not quite sure when this happened, but it was so long ago that I can't turn it off.”
Jonathan Gross in Discrete Mathematics (COMS W3203) on 2009-09-10