# 6.4400 Final Project Proposal

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## 1 Project Idea

We will implement **Non-Uniform Rational B-Splines (NURBS)** curves and surfaces, as well interactive manipulation of the control points. As we implemented B-splines and Bezier curves and patches in Assignment 1, NURBS is a natural extension. NURBS could be seen as a generalization of Bezier and B-splines, with the main difference being the weights of the control points making NURBS curves rational.

We plan on breaking the project down into steps similar to those of Assignment 1:

1. Implement NURBS curves (take in as input a file of control points, knot vectors, weights, and degree, and output the curve);

2. Implement NURBS patches / surfaces;

3. Give users the ability to edit the curve / surface by dragging control points around on the screen, so that the program is more interactive.

We've added the third part above to add more functionality / increase difficulty of the overall project.

We will be submitting a video, in addition to the code, to demonstrate our project's functionality. If we have extra time, we would like to import fun meshes and colors.

## 2 References

NURBS Wikipedia article: https://en.wikipedia.org/wiki/Non-uniform_rational_B-spline

Explainer / tutorial: https://www.codeproject.com/Articles/1095142/Generate-and-understand-NURBS-curves