

**Computer Graphics 2021**  
**Exercise 3: Subdivision Curves (Project 1)**

Prof. Dr. Martin Hering-Bertram  
Hochschule Bremen

The first project is concerned with Subdivision Curves and Surfaces. The code developed here needs to be explained in the next Laboratory session and checked into AULIS, later. The code must be authentic, e.g. it may not be shared with other groups. Code used from other sources needs to be declared in the heading comment block of your implementation.

**Laboratory:**

Present your development from Exercise 2: Reading and rendering triangle meshes from OBJ. The code and the data structures will be used for Project 1, later.

**Homework Problems:**

**Problem 1: Polygon Construction and Rendering**

- (a) Implement a function to read a sequence of 3D points from a file. Alternatively, you can develop a function to define the points by mouse click (set the z-coordinates to zero, right click ends polygon).
- (b) Render the polygon with GL\_LINE\_STRIP.

**Problem 2: Chaikin's Algorithm**

- (a) Implement a function that subdivides a vertex array once with Chaikin's Algorithm (mask on slide 1-4 of CG lecture). Use the vector template to represent the input and output polygons.
- (b) Render the original polygon and 3 subdivision levels using different colors.

**Problem 3: Interpolating Cubic Subdivision**

- (a) Implement a function that subdivides a vertex array once with the interpolating cubic scheme (mask on slide 1-8 of CG lecture; note that the mask is symmetric at the boundaries).
- (b) Render the original polygon and 3 subdivision levels using different colors.

**Your implementation should be readable, commented C++ code, to be demonstrated, explained and uploaded on March 3<sup>rd</sup>.**