CSC-758: Computational Geometry
(Fall 2018)
4:00pm – 5:15pm (Mondays and Wednesdays) – BEH 111
Course Description

Instructor: Dr. Laxmi P. Gewali

Computational geometry deals with the development and analysis of algorithms having geometric flavor. Knowledge of elementary data structures (arrays, heaps, balanced trees, etc) and algorithmic tools (asymptotic analysis, space time complexity, divide and conquer, dynamic programming, etc) are prerequisites for this course.

The topics we plan to present include:

Elementary geometric methods: points, lines and polygons. Line segments intersection. Simple closed path, inclusion in a polygon, inclusion in a convex polygon, range search, point location in planar subdivision and duality.

Convex hull: Graham's scan, Jarvin's march, divide and conquer approach, on-line algorithms, approximate algorithms, convex hull of simple polygons, lower bound proofs and diameter of a point set.

Proximity: Closest pair, triangulation, divide and conquer approach for closest pair, Voronoi diagram and their properties, dual of Voronoi diagram, construction of Voronoi diagram, Euclidean minimum spanning tree, gaps and covers.

Intersections: convex polygons, polygons, star polygons, line segments, half planes and plane sweep paradigm.

Mesh generation algorithms: Delaunay triangulation, quad-trees, and Quadrangulations.

Visibility and path planning: visibility properties of polygons, visibility graphs, applications of computational geometry in robotics, shortest s-t path inside a simple polygon, shortest s-t path amidst polygons, introduction to path planning in 3-d, decomposition of polygons.

Text Book:
Computational Geometry in C (Second Edition) by Joseph O'Rourke

Additional reading materials will be discussed in the class.

A students who has a documented disability that may require assistance, will need to contact the Disability Resource Center (DRC) for coordination in his/her academic accommodations. The Disability Resource Center is located in Student Services Complex A (SSC-A), Room 143. **Phone:** 702-895-0866
http://drc.unlv.edu/

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