This is an applied, hands-on, software programming class which explores the translation of multi-dimensional numerical data into an interactive, 3D visualization

Course prioritizes data analytic techniques for knowledge discovery and pattern recognition - frequency mapping - exploration of algorithms for data clustering - visualizing data - resulting in 3D interactive visualization projects in java-based Processing. The goal is to gain experience in the fundamentals of visual language to represent data.

There are 3 projects to be realized during the 10 week winter course:

**Project 1: Data Analytics, Knowledge Discovery, Content Analysis with MySQL**
*Goals:* Discover unexpected patterns, anomalies, etc. in a large multivariate dataset

*Data Source:* 97 million/15-year multi-dimensional datasets of library circulation

**Project 2: 3D Interactive Visualization, Frequency Data Mapping - Visual Language Basics**
*Goals:* Acquire visual language basics, visualize data in java-based Processing and p5, design in 3D-interactive space/time, implement associative rule-mining and other algorithms

*Data Source:* 97 million/15-year multi-dimensional datasets of library circulation

**Project 3: Student Defined Project**
*Goals:* Student defines a project with their own data source, a project that builds on skills acquired through the two previous assignments

*Data Source:* Each student selects their own datasets

**Knowledge acquired through the course:**
1) Learn to explore and retrieve significant data from a dataset with MySQL
2) Develop skills in the fundamentals of visual language expressed through programming
3) Visualize abstract data to reveal patterns and relationships, or to explore visualization
4) Normalize data to enhance legibility and coherence
5) Implement interactivity within 3D volumetric visualization
6) Correlate various data sources through JSON and APIs

**Links:**
Previous Syllabus [http://www.mat.ucsb.edu/~g.legrady/academic/courses/19w259/19w259.html](http://www.mat.ucsb.edu/~g.legrady/academic/courses/19w259/19w259.html)
Previous student projects [http://vislab.mat.ucsb.edu](http://vislab.mat.ucsb.edu)

**Prerequisite:** Basic to medium computer programming experience