**CMSC 828V – Visual Computing for Big Data**  
**Spring 2013**

**Course Overview:** This course will equip you with foundations and techniques for visual understanding of Big Data. The course will cover recent advances in many-core and multi-core processors, displays, and interaction tools as they impact visual computing for big data. We will also survey long-standing foundational principles of human perception, sampling and filtering, multiresolution techniques, and visual knowledge discovery techniques. We will study case studies from a variety of application domains, such as the life sciences, finance, ecology, GIS, and social networks to understand solutions that have worked in the past in transforming massive datasets into meaningful visual representations that are easy to understand and communicate.

**Lectures:** Tuesdays and Thursdays 2:00pm – 3:15pm CSIC 3120

**Professor:** Amitabh Varshney, 2119 AVW, (301)405-6722, varshney@umiacs.umd.edu.

**Office hours:** Tuesdays and Thursdays 3:30 – 4:30pm, or by appointment. For an appointment, just drop by my office, or call me, or send me an email and we can fix up a time.

**Texts:** There is no textbook for this course but papers and weblinks will be posted on the class webpage

**Prerequisites:** One course in graphics, visualization, or HCI at grad or undergrad level.

**Grading:** Presentations: 20%, Midterm: 20%, Project: 30%, Final Exam: 30%

**Final Exam:** Final Exam will be 10:30am – 12:30pm on Wednesday, May 15

**Academic Conduct:** I expect high standards of professional conduct and ethics. All work that you submit in this course must be your own or approved in advance by the instructor.

**Qualifying course for MS and PhD:** This course will count towards PhD and MS qualifying coursework in the Visual and Geometric Computing area. The MS comprehensive course grade will be based on midterm and final exams (in the 40-60 ratio specified above).
Tentative Course Plan

Overview
Jan 24       Visual Computing Pipeline and Big Data Challenges
Jan 29       Visual Knowledge Discovery

Foundations
Jan 31       Perception and Saliency
Feb 5        Processor Advances: CPUs and GPUs
Feb 7        Displays and Cameras
Feb 12       Scientific Visualization
Feb 14       Information Visualization
Feb 19       Sampling and Filtering

Techniques
Feb 21       Visual Summaries
Feb 26       Project proposal presentations, reports, and web pages
Feb 28       Project critiques and discussion
Mar 5        Interaction for Visualization
Mar 7        Multiresolution Techniques
Mar 12       Clustering
Mar 14       Midterm Exam
Mar 19 and 21 Spring Break
Mar 26       Data Analytics
Mar 28       Cache/Memory-aware Visualization

Applications
Apr 2        Meshes, Graphs, and Network Layouts
Apr 4        Streaming Data: Financial, Ecological, Network, Sensors
Apr 9        Brain Imaging
Apr 11       Cell Imaging
Apr 16       GIS Visualization
Apr 18       Maps, Street views, and Laser scanning
Apr 23       Optical robotics
Apr 25       Climate simulations
Apr 30       Text Visualization
May 2        Social Network Visualization
May 7        Project Presentations and Final Project Report
May 9        Course Wrap-up
May 15       Final Exam, Wednesday, 10:30am – 12:30pm