

# ASU Computer Science and Engineering Department

CSE 591 – Data Visualization  
BYAC 190 3PM-4:15PM MW  
Syllabus – Spring 2013

## *Instructor and Office Hours:*

**Instructor:** Ross Maciejewski  
**Office:** Brickyard 344 (3<sup>rd</sup> floor)  
**Phone:** 480-965-2785  
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**Webpage:** <http://datavisualization.courses.asu.edu>  
**Office Hours:** MW 4:15PM – 5:15PM

If these hours are not convenient, I will be happy to make appointments to meet.

## **Catalog Description:**

**Introductory Topics Include:** purposes and goals of visualization, applications, challenges, sources of data: measurement, simulation, modeling, data dimensionality: 1D, 2D, 2.5D, 3D, time-dependent, data types: scalar, vector, nominal, multi-variate, grid types: regular, rectilinear, curvilinear, unstructured, hybrid, point-based or scattered data

**Information Visualization Topics Include:** abstract data, hierarchical data, conventional information visualization techniques, tree maps, focus and context techniques, fisheye views, hyperbolic trees graphs and graph layouts, multi-dimensional data, scatter plots, scatter plot matrices, icons, parallel coordinates, interaction techniques, linking and brushing, magic lenses, tool glasses

**Volume Visualization Topics Include:** slicing, MPI (multi-planar reconstruction), surface vs. volume rendering, transfer functions: compositing, MPI (maximum intensity projection), scalar data, sources of volume data, challenges, voxels vs. cells, interpolation schemes, direct volume visualization: ray casting, splatting, 3D texture mapping, surface fitting methods: marching cubes, marching tetrahedra, image order vs. object order algorithms, gradients optical models for volume rendering

## **Course Objectives and Outcomes:**

This course is designed to provide a comprehensive introduction to Data Visualization.

- Students will learn the foundations of visualization design.

## **Prerequisites:**

None

## **Textbook:**

None

**Note, all dates, times and other information are subject to modification throughout the semester!**

**Grading:** The grading schema is broken down as follows

Item	Number of Items	Percent of Final Grade
Quizzes	6	10%
Homework Assignments	6	15%
Class Project	1	40%
Midterm Exam	1	15%
Final Exam	1	20%

**Assignments:**

This class is meant to teach students the fundamentals of data visualization. Homework assignments will include sample data sets that focus on the implementation and exploration of fundamental data visualizations. Students will be allowed to drop their lowest homework score.

**Quizzes and Attendance:**

Attending class is important in order for you to be aware of what is going on. Often, announcements will be made or information will be discussed that is not available on blackboard. Your attendance grade will be determined by in-class quizzes. Quizzes are used to help give students guidance on the types of questions they can expect on their exams. Answers will be discussed in class, and quizzes will be graded by the instructor. Students will be allowed to drop their lowest quiz score.

**Grade Breakdown:**

<b>A+</b>	<b><math>\geq 97\%</math></b>
<b>A</b>	<b><math>\geq 93\%</math> and <math>&lt; 97\%</math></b>
<b>A-</b>	<b><math>\geq 90\%</math> and <math>&lt; 93\%</math></b>
<b>B+</b>	<b><math>\geq 87\%</math> and <math>&lt; 90\%</math></b>
<b>B</b>	<b><math>\geq 83\%</math> and <math>&lt; 87\%</math></b>
<b>B-</b>	<b><math>\geq 80\%</math> and <math>&lt; 83\%</math></b>
<b>C+</b>	<b><math>\geq 77\%</math> and <math>&lt; 80\%</math></b>
<b>C</b>	<b><math>\geq 73\%</math> and <math>&lt; 77\%</math></b>
<b>C-</b>	<b><math>\geq 70\%</math> and <math>&lt; 73\%</math></b>
<b>D</b>	<b><math>\geq 60\%</math> and <math>&lt; 70\%</math></b>
<b>E</b>	<b><math>&lt; 60\%</math></b>

**Schedule:**

<b>Week</b>	<b>Monday</b>	<b>Wednesday</b>
1/7 – 1/11	Lecture 1 - Syllabus What is Data Visualization	Lecture 2 - Data Representation
1/14-1/18	Lecture 3 – Visual Perception	Lecture 4 - Color  <b>Assignment #1 – Due</b>
1/21-1/25	<b>MLK Holiday No Class!</b>	Lecture 5 - Statistics and Graphics  <b>Milestone #1 Due</b>
1/28-2/1	Lecture 6 - Multivariate Visualization	Lecture 7 - Dimensional Reduction Techniques  <b>Assignment #2 – Due</b>
2/4-2/8	Lecture 8 - Time Series Visualization and Analysis	Lecture 9 - Geographical Visualization  <b>Assignment #3 – Due</b>
2/11-2/15	Lecture 10 - Geographical Analysis	Lecture 11 - Interaction  <b>Assignment #4 – Due</b>
2/18-2/22	Lecture 12 - Focus + Context Visualization	Lecture 13 - Graphs and Networks  <b>Milestone #2 Due</b>
2/25-3/1	Review	<b>Midterm Exam</b>
3/4-3/8	Lecture 14 - Network Analysis	Lecture 15 - Tree and Hierarchies
3/11-3/15	<b>Spring Break No Class!</b>	<b>Spring Break No Class!</b>
3/18-3/22	Lecture 16 - Hierarchical Clustering	Lecture 17 – Animation  <b>Assignment #5 – Due</b>
3/25-3/29	Lecture 18 - Visual Storytelling	Lecture 19 – Volume Visualization I  <b>Assignment #6 – Due</b>
4/1-4/5	Lecture 20 – Volume Visualization II	Lecture 21 – Volume Visualization II (Cont.)
4/8-4/12	Lecture 22 – Volume Visualization III	Lecture 23 – Introduction to Flow Visualization  <b>Milestone #3 Due</b>
4/15-4/19	Project Presentations	Project Presentations
4/22-4/26	Project Presentations	Project Presentations
4/29-5/3	Final Review <b>Milestone #4 Due</b>	<b>No Class, Classes Over!</b>
5/6	Final Exam (12:10-2PM) BYAC 190	