COURSE DESCRIPTION
This course will expose students to skills and techniques related to the visualization of large datasets, from static images to dynamic 3D modeling. The skills-based course includes modules on data preparation, knowledge representation, identifying structural relationships within data and visual design principles. Conceptual themes will be presented alongside technical aspects of data visualization. Students will use a suite of visualization tools and work with real-world datasets. Attention will be given to displaying data in response to audience needs.

OBJECTIVES
The learning objectives for this course are adapted from the American Library Association’s Visual Literacy Competency Standards (more information available at: http://www.ala.org/acrl/standards/visualliteracy). Visual literacy enables you to effectively find, interpret, evaluate, use, and create images and visual media. In the context of this course, you will be interpreting, critiquing and creating visual representations of large data sets.

This course will enable you to:
- Identify and define user needs related to visual representation of large data sets
  - Articulate ways images can be used to communicate data and information
  - Identify discipline-specific conventions for visualization use
  - Recognize when more information about an image is needed, develop questions for further research, and conduct additional research as appropriate
  - Define and articulate goals of a data visualization, including purpose and evaluation criteria
- Interpret and analyze the meanings of data visualizations and information graphics
  - Explore choices made in the production of a visualization to construct meaning or influence interpretation
  - Describe the intended audience for a visualization
  - Describe graphic, and aesthetic elements of visualization (e.g., color, composition, line, shape, contrast, repetition, style)
  - Evaluate the effectiveness and reliability of visualizations
  - Make judgments about the reliability and accuracy of visualization sources
- Design and create meaningful data visualizations
  - Use appropriate editing, presentation, communication, storage, and
media tools and applications to prepare and work with data visualizations

- Construct accurate and appropriate graphic representations of data and information
- Use aesthetic and design choices deliberately to enhance effective communication and convey meaning

- Understand many of the ethical, legal, and social issues surrounding the creation and use of data visualizations

REQUIRED TEXTS

*Visualize This: The FlowingData Guide to Design, Visualization, and Statistics*  

*Data Points: Visualization That Means Something*  

*An Introduction to Data Science*  
By Jeff Stanton. Free iTunes download.  [DS in schedule]

RECOMMENDED BLOGS AND WEBSITES

*Many Eyes*  
http://www.informationisbeautiful.net/  
http://flowingdata.com/  
http://visual.ly/  
http://eagereyes.org/  
http://colorbrewer2.com/

ADDITIONAL READING

*The Visual Miscellaneum, 2nd Edition*  
By David McCandless


*Beautiful Data: The Stories Behind Elegant Data Solutions*, Edited by Toby Segaran and Jeff Hammerbacher. O'Reilly, 2009.

*Beautiful Visualization: Looking at Data Through the Eyes of Experts*, Edited by Julie Steele and Noah Illinsky. O'Reilly, 2010.
**COURSE STRUCTURE**
This class will provide many opportunities to learn about data visualization through hands-on experimentation with tools, design concepts and real-world datasets.

Course material will be delivered as:
- Assigned readings introducing concepts and techniques
- Group discussions focusing on assigned readings and real world examples of data visualizations
- Skill-based learning modules introducing graphic design principles, features of the R programming environment and features of Adobe Illustrator
- Student presentations
- Critiques of student work

Creating effective visualizations requires both programming and design skills. This semester, we will be using the R programming environment combined with Adobe Illustrator in order to introduce the basic concepts of representing large data sets in a visual format.

**TENTATIVE SCHEDULE**
This is a preliminary schedule, subject to change.

<table>
<thead>
<tr>
<th>Week</th>
<th>Theme</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 26 **What is data visualization?** Observing, Interpreting, Communicating</td>
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<td>Sept 2 Labor Day</td>
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<td>2</td>
<td>Sept 9 **Choosing Tools** Intro to R and Adobe Illustrator</td>
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<td>3</td>
<td>Sept 16 **Asking questions and telling stories** Extracting narratives from data</td>
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<td>4</td>
<td>Sept 23 **Aesthetics, persuasion and audience** Graphic Design Principles</td>
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<td>5</td>
<td>Sept 30 **Viz-a-thon 1**</td>
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<td>6</td>
<td>Oct 7 **Practice, practice, practice** R Tutorials and Illustrator Tutorials</td>
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<tr>
<td>7</td>
<td>Oct 14 **Practice, practice, practice** R Tutorials and Illustrator Tutorials</td>
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<td>8</td>
<td>Oct 21 **Is a picture worth a thousand words?** Evaluation and ethics</td>
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<td>9</td>
<td>Oct 28 Final project concepts</td>
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<td>10</td>
<td>Nov 4 **Show and Tell** Advanced Topics Presentations</td>
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<tr>
<td>11</td>
<td>Nov 11 **Show and Tell** Advanced Topics Presentations</td>
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<td>12</td>
<td>Nov 18 **Viz-a-thon 2**</td>
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<td>Nov 25 Thanksgiving</td>
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<td>13</td>
<td>Dec 2 **Open House** Final project poster session</td>
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**ASSIGNMENTS AND GRADING**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of total grade</th>
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<tbody>
<tr>
<td>Participation and attendance</td>
<td>10%</td>
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<tr>
<td>Contributing to class blog</td>
<td>10%</td>
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<tr>
<td>Advanced topic presentation</td>
<td>20%</td>
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<tr>
<td>Exercises and quizzes</td>
<td>30%</td>
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<tr>
<td>Final project</td>
<td>30%</td>
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Grading and feedback
Assignments will be given at least one week prior to when they are due. If you have any questions or concerns about a completing an assignment it is your responsibility to ask questions during class, contact me outside of class (well before the due date), and/or make an appointment to discuss it with me further (before the due date).

Every assignment will include a list of required items and a rubric that will be used to structure the evaluation of your work. Each project will receive a numeric grade and I will provide comments about how you can improve your work in the future.

If you simply meet the requirements for a given assignment, you will probably receive a B. In order to get an A, you will need to go above and beyond the basic requirements.

Weekly
EXERCISES AND ACTIVITIES: Weekly assignments will involve readings, technical exercises and project-specific activities (such as identifying a real world data set that you would like to work with). You will be asked to make both formal and informal presentations throughout the semester. You will also need to complete a series of quizzes posted throughout the semester. These will combine to make up 30% of your final grade.

Ongoing
CLASS BLOG: Every week you are expected to add at least one entry and comment on at least two other posts. Use this as an opportunity to keep track of thoughts, ideas, questions and inspirations. This material will eventually help you to define the topic for your final project. This is worth 10% of your final grade.

The blog is accessible at IST719.wordpress.com

PARTICIPATION: You are expected to make voluntary contributions to class discussions on a regular basis. Participation is evaluated base on 1) your engagement during discussions and group activities, as well as 2) attendance, and 3) arrival to class on time and ready to work. This is worth 10% of your final grade.

ADVANCED TOPIC PRESENTATIONS: There are many other options available for creating visualizations. Examples of other visualization environments include (but are not limited to) C4, D3, Processing, Tableau, GapMinder, and SenseUs. In order to give you a taste of these other options, each of you will be selecting and presenting an “advanced topic” to the class, highlighting a product or application of your choosing. Your advanced topic presentation will contribute 20% to your final grade.

FINAL PROJECT: The final project, including poster session, is worth 30% of your final grade. You will begin working on your final project on the first day of class, with key deliverables being due throughout the semester. These assignments will be graded separately from your final deliverable and will involve:

1. Picking and preparing a dataset
2. Defining an audience and requirements for your visualizations
3. Experimenting with different visual encoding and graphic design choices
4. Conducting user testing
5. Executing your visualization
6. Presenting your final product

Throughout the semester, use your blog posts, class discussions and exercises to explore topics or questions that you find compelling. Details about requirements for each stage of the final project will be provided at least one week before due dates.

CLASS POLICIES

Office hours
My office hours are by appointment on Mondays or Tuesdays. It will be mandatory for each of you to schedule a meeting with me before midterm to discuss your progress in the class. It is your responsibility to meet with me outside of class if you have any questions about grading, evaluation and/or any aspect of your performance.

Attendance and Participation
Attendance is required and excused only for medical or special circumstances, with appropriate notes from doctors, etc. Each absence beyond three (including both excused and unexcused) during the semester will result in an automatic drop in your final grade of one whole letter (i.e., from a final grade of B to a C).

If you need to miss a class, email the instructor ***before*** the missed class. You are responsible for obtaining class notes, materials and assignments from a classmate.

Lateness is defined as coming in after roll call. After 4 “lates,” each subsequent “late” will result in your final grade being dropped one letter.

Failure to participate will negatively impact your grade. Participation includes being present in class, voluntarily contributing to discussions, completing all assignments on time and actively engaging with team members during group assignments.

Homework Policy
Assignments are due by 11am on the due date. Late assignments will be penalized. Your work will also be penalized if you do not follow the file naming convention specified on the assignment sheet. Generally, all assignment should be named as follows: AssignmentName_LastName.extension (usually .PDF)

Future Use of Student Work
This course may use course participation and documents created by students for educational purposes. In compliance with the Federal Family Educational Rights and Privacy Act, works in all media produced by students as part of their course participation at Syracuse University may be used for educational purposes, provided that the course syllabus makes clear that such use may occur. It is understood that registration for and continued enrollment in a course where such use of student works is announced constitutes permission by the student. After such a course has been completed, any further use of student works will meet one of the following conditions: (1) the work will be rendered anonymous through the removal of all personal identification of the work’s creator/originator(s); or (2) the creator/originator(s)’ written permission will be secured. As generally accepted practice, honors theses, graduate theses, graduate research projects, dissertations, or other exit projects submitted in partial fulfillment of degree
requirements are placed in the library, University Archives, or academic departments for public reference.

**Academic Integrity**
Syracuse University’s Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the policy and know that it is their responsibility to learn about course-specific expectations, as well as about university policy. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first offense by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of Academic Integrity Policy. The standard sanction for a first offense by a graduate student is suspension or expulsion.

For more information and the complete policy, see [http://academicintegrity.syr.edu](http://academicintegrity.syr.edu)

**Disability-Related Accommodations**
If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), [http://disabilityservices.syr.edu](http://disabilityservices.syr.edu), located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

**Religious Observances Policy**
SU religious observances policy, found at [http://supolicies.syr.edu/emp_ben/religious_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm), recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/StudentServices/Enrollment/MyReligiousObservances from the first day of class until the end of the second week of class.