Data Visualization and Communication
EDS 240 – Winter 2023

Class times: Thursdays 1:00–4:00 pm, January 12 – March 16, 2023
(10 meetings)
Class location: Bren Hall 3035
Final project due March 24, 2023

Instructor: Stacy Rebich Hespanha
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Office Hour: Thursdays 4:00-5:00pm (immediately after class), BH 3035

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Office Hour: Thursdays 12:00-1:00 PM, Noble Hall 2125

Description: This course will focus on basic principles for effective communication through data visualization and interactivity. Students who complete the course will deepen their understanding of how people perceive and interpret graphical representations, and will learn about information visualization frameworks they can apply to design intuitive and impactful data visualizations. Beyond effective visualization design, we will explore the idea of human-centered design as it relates to development of data visualizations and interactive data tools. While most assignments for the course may using any software or computing environment students choose, students will spend time in class gaining familiarity with Tableau and Tableau Prep Builder for both static and interactive data visualization design.

This course is co-requisite with EDS 411A and assignments for the course will focus on developing and testing data visualization and interaction design elements for the Capstone Projects.

Format: Each week's class will be a combination of lecture / discussion time and work time. For the first five weeks, lectures and discussions will focus mostly on visual design theory and practice, human-centered design approaches, and interactivity design principles. The last five weeks of the class will focus on hands-on practice with Tableau in the form of guided tutorials and more open-ended 'hacky' activities. There will be workshop time in class throughout the quarter to work on activities, assignments, and to give and receive peer feedback.

Computing Requirements: Students should plan to install Tableau Desktop and Tableau Prep Builder on their own computers to use for completing Tableau-dependent class activities. Although we spend some time in the course gaining familiarity with Tableau, students may also complete most assignments using computing tools of their choice (e.g., R/Shiny). Information about how to download and install Tableau products (including software activation key) will be made available via Canvas.
**Grading:** Letter grades will be assigned at the end of the course. Grades will not be curved, and will be based on the number of points earned primarily through assignments focused on the capstone project. Detailed information about grading (including re-submission and extra credit options) is available on Canvas.

**ASSIGNMENTS**
All assignments will be submitted digitally via Canvas. Detailed assignment descriptions and grading criteria will also be available through Canvas.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
<th>Value</th>
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<tbody>
<tr>
<td>Beginning of course survey</td>
<td>January 13</td>
<td>5 points</td>
</tr>
<tr>
<td>Client interview</td>
<td>January 20</td>
<td>10 points</td>
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<tr>
<td>Project design brief, including personas</td>
<td><strong>February 14</strong></td>
<td><strong>20 points</strong></td>
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<tr>
<td>Evaluation plan - draft</td>
<td>February 21</td>
<td>5 points</td>
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<tr>
<td>Evaluation plan – peer review</td>
<td>February 23</td>
<td>5 points</td>
</tr>
<tr>
<td><strong>Evaluation plan - final</strong></td>
<td><strong>February 24</strong></td>
<td><strong>15 points</strong></td>
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<tr>
<td>Tableau parallel activity for Shiny workshop (tentative)</td>
<td>March 9</td>
<td>5 points</td>
</tr>
<tr>
<td>Evaluation results &amp; plan for design adjustments - draft</td>
<td>March 14</td>
<td>10 points</td>
</tr>
<tr>
<td>Evaluation results &amp; plan for design adjustments - review</td>
<td>March 16</td>
<td>10 points</td>
</tr>
<tr>
<td>Evaluation results &amp; plan for design adjustments - final</td>
<td>March 24</td>
<td>25 points</td>
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**COURSE READINGS**
TBA, will be provided through Canvas

**SCHEDULED TOPICS AND ACTIVITIES**

*Week 1: Designing for People: Visual and Interactivity Design*

*Jan 12*

We will spend some time discussing and thinking about where people fit into the design and development processes, with a special focus on the Human Centered Design approach. We will examine the value user research brings to the design process, and explore techniques you can use to gather the information you will need to make sure that your data visualization and/or interaction design is a good fit for the people who will be using it. We will end the session with some activities that will help you to strategize and prepare for your first assignment.

*Week 2: Visual Perception and Cognition; Principles of Visual Design*

*Jan 19*

We will begin by discussing students’ existing ideas regarding what makes a good data visualization, and then proceed to lecture segments focusing on a brief overview of human perception and cognition of visual information, basic design principles, and multimedia communication principles. We will identify and apply ideas related to visual hierarchy in discussions of example visualizations we consider effective or ineffective.
Week 3: Communicating Research Visually; Visual Variables and Basic Chart Types  
Jan 26

We will identify some of the challenges we face when attempting to communicate about research data and findings, and discuss some ways to safeguard against inducing bias or misunderstanding in response to scientific data visualizations. We will explore the visual variables that can be used to represent data effectively, and gain a deeper understanding of how basic chart types rely on viewers perceiving and performing a sequence of visual queries and tasks. We will end the class with a brief Tableau demo and information about available tutorials.

Week 4: Measurement Theory and Visual Design; Preparing Data for Visualization  
Feb 2

We will begin by reviewing basic principles of measurement theory and examining how measurement properties of variables inform appropriate strategies for visual design. We will explore how selection, normalization, classification and simplification techniques can be used to prepare data for visualization. We will use existing data to practice these data preparation strategies and apply appropriate visualization techniques to critique and describe re-designs for a variety of data visualizations.

Week 5: Visual Storytelling; Typography  
Feb 9

We will begin by exploring visual storytelling genres and techniques, and review case studies that demonstrate (or fail to demonstrate) application of these techniques. We will examine infographics in some detail and discuss strategies for using basic design principles and tools together with data visualization principles to create engaging visual representations that also tell a story based on patterns in data. We will focus on techniques for using typography effectively, overcoming special challenges faced for map-based visualization.

Weeks 6-10: Tableau Tutorials and ‘Hacky’ Activities; Project Workshop  
Feb 16, Feb 23, Mar 2, Mar 9, Mar 16

During the last five weeks of the course, we will have workshop-style activities each week in Tableau. One of these weeks (tentatively March 9), we will use Tableau to work with the same dataset used during the Shiny workshop. Each week there will also be time to work on data visualization and interactivity aspects of capstone projects, including opportunities for project-focused peer and instructor feedback.

On the last day of class, we will spend ~15 minutes discussing course outcomes and student feedback on what worked well, and also how to improve the course.