

DATA VISUALIZATION AND DASHBOARDS

Course Information:

Spring 2024: Course 90-885 , 6 Units

Location: Heinz College Washington DC

Meeting Times: Tuesday 6:00-8:50PM

Faculty: Trevor Filipiak

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Office Hours: By Appointment

Prerequisites:

- 90-711 Statistical Methods (or comparable)
- 90-728 Introduction to Database Management

Course Rationale:

Modern data visualization technology is causing a paradigm shift in the way organizations convert raw data into actionable information. Visualization facilitates rapid understanding of trends and outliers within datasets. Moreover, modern data visualization tools are at the forefront of the “self-service analytics” architectures which are decentralizing analytics and breaking down IT bottlenecks for business experts.

Therefore, this course will provide students with a formal grounding in data visualization as well as hands-on experience using Tableau, a popular modern software package. These skills will serve students in their early career and continue to pay dividends in the future.

Course Description:

This course is designed to introduce data visualization as an analytical tool, a medium of communication, and the basis for interactive information dashboards. Students will learn best practices in data visualization, sharpen analytical skills, and learn how to design dashboards for use by stakeholders.

Students will have the opportunity to practice skills with concrete deliverables, and will synthesize course material in a comprehensive final project. This project will reinforce comfort with the Tableau software package and will provide a portfolio item for students.

Students will use Tableau as their main tool to visualize data and develop dashboards but will develop transferrable skills which can apply to many of the most popular software packages in the current marketplace.

Course Materials:

- **Tableau Desktop:** Students should download and install the free version of Tableau for class use here: <http://www.tableau.com/academic/students>
- **Textbooks:**

(Optional) Show me the Numbers: Designing Tables and Graphs to Enlighten.
by **Stephen Few**

Course Objectives:

At the end of the course, students will be able to:

- Employ best practices in data visualization to develop charts, maps, tables, and other visual representations of data.
- Use Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
- Create compelling, interactive dashboards to combine several visualizations into a cohesive and functional whole.
- Utilize advanced Tableau features including parameters, data blending, custom SQL, very large datasets, custom date hierarchies, and others.
- Use data visualizations, dashboards, and Tableau Stories to support relevant communication for diverse audiences.

Course Requirements:

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| Grades will be based on: | Class participation | 15% |
| | Weekly Take-Home Assignments: | 30% |
| | Final Project – Initial Proposal | 5% |
| | Final Project – Dataset Assessment | 5% |
| | Final Project – Deliverable & Presentation | 40% |
| | Final Project – Peer review | 5% |

Take-Home Assignments:

Each Wednesday, I will post the take-home assignment due the following week (Tuesday) before the start of class.

Staying on top of the deliverables for the final project will be a major part of the course. I will use Canvas announcements and lecture slides to share these milestones with you.

Course Outline:

Specific datasets and grading rubrics for deliverables, in-class activities, and final project will be distributed throughout the mini.

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| Week 1 | <ul style="list-style-type: none">Introductions<ul style="list-style-type: none">o Review of Syllabuso “What Tableau can and cannot do well”o Debug and troubleshoot installation and configuration of the softwareo Introduce the final projectConfiguring Data Environment<ul style="list-style-type: none">o Connecting to Datao Metrics vs dimensionso Data Visualization Concepts |
| Week 2 | <ul style="list-style-type: none">Discussion of workflowExploratory Visualization<ul style="list-style-type: none">o Data Joinso Best Practiceso Creating visualizations with Tableauo Sorting, Top N, bottom No Filteringo Maps |
| Week 3 | <ul style="list-style-type: none">Visual Analytics<ul style="list-style-type: none">o Optimal visualization typeso Binning valueso Calculated fieldso Table calculations |
| Week 4 | <ul style="list-style-type: none">Dashboard development -<ul style="list-style-type: none">o Dashboard design principleso Dashboard interactivityo Connected “drill-down” dashboards |
| Week 5 | <ul style="list-style-type: none">Working with stakeholders and creating analytical products<ul style="list-style-type: none">o Stakeholder categorieso Receiving feedbacko Performing design iterations |
| Week 6 | <ul style="list-style-type: none">Visual Analytics<ul style="list-style-type: none">o Level of Detail Calculations |

Plagiarism and cheating notice

Plagiarism and other forms of academic misrepresentation are taken extremely seriously. Misrepresentation of another's work as one's own is widely recognized as among the most serious violations. The violation is clearly flagrant when it occurs as plagiarism on a required paper or assignment or as cheating on an examination, regardless of whether it is a take-home or in-class examination. The punishment for such offenses can involve expulsion from the program. There are many other ways in which a violation can occur.

Academic Dishonesty: Students are expected to maintain the highest ethical standards inside and outside the classroom. Cheating on exams and term papers (i.e. plagiarism and unauthorized collaboration) is obviously discouraged and will be treated appropriately. The usual penalty for violations is a failing grade for the particular assignment in question; however, in some instances, such actions may result in a failing grade for the course.

Cheating includes but is not limited to:

1. Submission of work that is not your own for papers, assignments, lab exercises, or exams
2. Submission or use of falsified data
3. Theft of or unauthorized access to an exam, current or previous
4. Use of an alternate, stand-in or proxy during an examination
5. Use of unauthorized material including textbooks, internet material, notes, or computer programs in the preparation of an assignment or during an examination, unless otherwise indicated
6. Supplying or communicating in any way unauthorized information to another student for the preparation of an assignment or using an examination
7. Collaboration in the preparation of a solution to a problem unless expressly allowed by the instructor

Plagiarism includes, but is not limited to, failure to indicate the source with quotation marks or footnotes where appropriate if any of the following are reproduced in the work submitted by a student:

- A graphic element
- A proof
- A phrase, written or musical
- Specific language

- An idea derived from the work, published or unpublished, of another person
- Program code or algorithms

If you are unsure about what is acceptable collaboration, please consult with me.

Penalties for plagiarism and cheating:

Penalties imposed are at the instructor's discretion. In this class, the penalty can be any of the following:

- Zero on the assignment
- A letter grade reduction for final grade (Final grade of B becomes C)
- A failing grade in the course