Syllabus

Data Visualization: Principles & Applications

**Instructor**

* Rahul Basole, College of Computing
* Alex Endert, College of Computing
* John Stasko, College of Computing

**Goal**

This graduate course focuses on the introductory design principles and applications of data visualization. The course teaches best practices for visualizing datasets from diverse domains intended to help people make sense of data.

**Readings**

Readings will be drawn from survey papers, best practice reports, practitioner documents, and course notes.

**Grading**

Grading will be based on class participation, homework assignments involving design, use, and analysis of data visualization tools, cumulative exams, and a team-based semester project.

* **Homework assignments are worth 25%.** These are intended to build and assess understanding of the core technical concepts and techniques covered in class.
* **Two exams, worth 20% each.** These are intended to assess cumulative understanding of design principles, technical concepts, and applications of data visualizations.
* **A final project worth 30%.** This is intended to assess your ability to apply the technical concepts in the class to a challenging dataset/problem.
* **Class participation, worth 5%**. This is intended to motivate an engaging classroom discussion.

**Learning Objectives and Educational Outcomes**

Data visualization is a rich research area that focuses on the design, development, and use of visual representations and interaction techniques to help people understand, explore, and analyze data.

The objectives of this course are:

* Learn fundamental principles of effective data visualization.
* Understand the wide variety of data visualization techniques and know what visualizations are appropriate for various types of data and for different goals.
* Understand how to design and implement data visualizations using commercial and open-source software tools.
* Know how data visualization uses dynamic interaction methods to help users explore, analyze, and make sense of data.
* Gain an understanding of human perceptual and cognitive capabilities to the design of effective data visualizations.
* Develop skills in critiquing different data visualization techniques in the context of user goals and objectives.

The course will follow a lecture/seminar style with discussions, guest speakers from industry and academia, viewing of best-practice videos, and hands-on project experience with data visualization design and development.

**Academic Integrity**

Students are encouraged to discuss the design problems, homework assignments and readings outside of class. However, everyone must submit their own work, and you may not share code or answers. If your discussion with another student helped you make a breakthrough on a difficult problem, that is fine, but give credit!  The final project may be performed in teams of at most four students.  Suspected cases of honor code violations will be handled through the Office of Student Integrity. If you have a question about collaboration policy, please ask.  For more information, please visit <http://www.catalog.gatech.edu/policies/honor-code/>

**Learning Accommodations**

If needed, we will make classroom accommodations for students with documented disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services (<http://disabilityservices.gatech.edu)>.

**Excused Absence policy**

We will enforce the excused absence policy listed in the Georgia Tech Rules Catalog Section IV (http://www.catalog.gatech.edu/rules/4/)

**Outline/Schedule of Topics**

The schedule that follows is from the 2018 edition of the course CS8803-DV.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Topic** | **Homework** | **Project Milestones** |
| 1 | Introduction |  |  |
| 2 | Data Visualization Overview | HW0: Survey |  |
| 3 | *MLK Holiday (no class)* |  |  |
| 4 | Multivariate Data & Tables | HW1: Examples |  |
| 5 | Graphs and Charts |  | PM0: Pitch |
| 6 | Lab (Tableau) | HW2: Multivariate |  |
| 7 | Visual Perception |  |  |
| 8 | Hypervariate Data |  | PM1: Teams |
| 9 | Temporal & Sequential Data |  |  |
| 10 | Graph & Network Data | HW3: Timeline |  |
| 11 | Lab (Gephi) |  | PM2: Description |
| 12 | Hierarchies & Trees | HW4: Network |  |
| 13 | Exam 1 |  |  |
| 14 | Text and Documents |  |  |
| 15 | Design Principles |  | PM3: Data |
| 16 | Narrative & Storytelling | HW5: Text |  |
| 17 | Lab (Tableau + Illustrator) |  |  |
| 18 | Geospatial Data |  | PM4: Designs |
| 19 | Guest: Twitter |  |  |
| 20 | Interaction | HW6: Geospatial | PM5: Status  PM6: Peer Evaluation |
| 21 | *Spring Break (no class)* |  |  |
| 22 | *Spring Break (no class)* |  |  |
| 23 | Guest: Juice Analytics |  |  |
| 24 | Evaluation |  |  |
| 25 | Exam 2 |  |  |
| 26 | Visualization Systems & Toolkits |  | PM7: Status |
| 27 | Visual Analytics + Advanced Topics |  |  |
| 28 | Guest: Bloomberg |  |  |
| 29 | Project Day |  |  |
| 30 | Final Project Presentation I |  | PM8: Demo + Infographic |
| 31 | Final Project Presentation II |  |  |
|  |  |  |  |
| 32 | Exam Period |  | PM9: Video  PM10: Peer Evaluation |