

# 5122 – Visual Analytics and Storytelling

This course introduces the fields of data visualization and visual analytics, which integrates interactive analytical methods and visualization. Topics include: visual reasoning (perception / cognition), principles of interaction, information graphics in statistical analysis and other analysis techniques, modern tools / libraries, and developing effective visualizations for information-based narratives.

**Prerequisites:** STAT 1220, STAT 1221, STAT 1222, STAT 2122, or STAT 2223, or approval of the instructor

## Learning Outcomes:

1. Learn data visualization techniques & theory
2. Use visualization to both explore and convey information effectively
3. Select, design, implement, and critique both static and interactive visualizations
4. Design and deliver effective information-based narratives to educate and persuade
5. Become familiar with common code-based libraries and interactive tools for visualization

## Schedule (subject to change):

Date	Section	Topics
<b>Week 1</b>	Introduction to visual analytics and analytical storytelling	<ul style="list-style-type: none"><li>• visualization for exploring and informing</li><li>• case studies / examples</li></ul>
<b>Week 2</b>	Data visualization fundamentals	<ul style="list-style-type: none"><li>• basic chart types and appropriate use</li><li>• visualizations beyond the basic charts</li><li>• small multiples / panels, data grids, heatmaps, treemaps, geospatial maps, etc.</li></ul>
<b>Week 3</b>	Modern charting in Python, R, and JavaScript	<ul style="list-style-type: none"><li>• libraries and visualization grammars</li><li>• ggplot2, seaborn, matplotlib, vega-lite, etc.</li></ul>
<b>Week 4</b>	Visual exploration: interactive tools and methods	<ul style="list-style-type: none"><li>• implications of data quality and storage methods</li><li>• infrastructure / architecture to support visual analysis</li></ul>

		<ul style="list-style-type: none"> <li>• Tableau, Power BI, Qlik Sense, Apache Superset, etc.</li> </ul>
<b>Week 5</b>	Dashboards and data applications	<ul style="list-style-type: none"> <li>• visualization and interactivity to support decisions</li> <li>• dashboard design principles</li> <li>• Tableau, Streamlit, Gradio, etc.</li> </ul>
<b>Week 6</b>	Building effective visuals	<ul style="list-style-type: none"> <li>• awareness of human cognition / perception</li> <li>• understanding and adopting good aesthetics</li> <li>• effective labeling, use of color, etc.</li> <li>• visualizing and explaining multi-dimensional data</li> <li>• chart junk and removing clutter</li> <li>• analyze and critique visuals</li> </ul>
<b>Week 7</b>	Developing your story	<ul style="list-style-type: none"> <li>• the persuasive power of visualization</li> <li>• narrative flow for effective communication</li> <li>• designing slides for presentations</li> </ul>
<b>Week 8</b>	Delivering your story (In-Person)	<ul style="list-style-type: none"> <li>• delivering compelling presentations</li> <li>• managing attention and interaction</li> <li>• best practices for presenters</li> </ul>
<b>Week 9</b>	Delivering your story (Written Media)	<ul style="list-style-type: none"> <li>• how medium affects your story</li> <li>• Web, spreadsheets, email, paper, and off-line slides</li> </ul>
<b>Week 10</b>	Special topics in visualization	<ul style="list-style-type: none"> <li>• visualizations for machine learning</li> <li>• generative AI and its impacts on information-based storytelling</li> <li>• other topics as appropriate</li> </ul>
<b>Week 11+</b>	Final Project Workshops & Final Presentations	

### Attendance:

Students are expected to attend every class and remain in class for the duration of the session. Failure to attend class or arriving late may impact your ability to achieve course objectives, which could affect your course grade. An absence, excused or unexcused, does not relieve a student of any course requirement. Regular class attendance is a student's obligation, as is a responsibility for all the work of class meetings, including tests and written tasks. Any unexcused absence or excessive tardiness may result in a loss of participation points. The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class.

### Class Recordings:

Class sessions may be audio- and/or video-recorded by the instructor for the purposes of student-participant reference and access by other students enrolled in the same course (including students enrolled in different class sections or break-out groups). **Students are not permitted to make their own recordings of class sessions or to share or distribute University recordings of class sessions.** NOTE: Students with specific electronic recording accommodations authorized by the Office of Disability Services may record classes; however, the instructor must be notified of any such accommodation prior to recording. Any distribution of such recordings is prohibited.

### Class Absence(s):

The instructor has the authority to excuse a student's class absence(s) and to grant a student an academic accommodation (turn in a late assignment, provide extra time on an assignment, reschedule an exam, etc.). However, under Academic Affairs [Policy on Course Attendance and Participation](#), University-sanctioned events or activities are considered excused absences. A University-sanctioned event or activity is one in which a student formally represents the University to external constituencies in athletic or academic activities. This policy does not supersede individual program attendance and/or participation requirements that are aligned with accreditation or licensure. For more information and student responsibilities to account for such an absence, see [provost.charlotte.edu/policies-procedures/academic-policies-and-procedures/course-attendance-and-participation](http://provost.charlotte.edu/policies-procedures/academic-policies-and-procedures/course-attendance-and-participation).

Students are encouraged to work directly with their instructors regarding class absences for **medical appointments, military/court orders, and/or personal and family emergencies**, such as a death in the immediate family, where a student is able to provide an instructor with appropriate supporting documentation of the absence. The final decision for approval of absences and missed work or make-up work is determined by the instructor.

For absences due to **religious observances**, students must provide the instructor with written notice of requested accommodations no later than the 10th day of instruction for the semester. The instructor and the student should then discuss what a reasonable accommodation should be in the given case and then document this agreed-upon accommodation. [University Policy 409](#) provides more details about this procedure. The [Office of Civil Rights and Title IX](#) is available as a resource if students or faculty have questions about the process.

The [Office of Student Assistance and Support Services \(SASS\)](#) can provide notification to faculty of **emergency situations**, when a student is unable to do so and when the office has been made aware of such emergencies. In such situations, the SASS office may also be able to assist with verification of such emergencies, once a student is able to return to classes. The SASS office does not provide verification of absences for car trouble, weather issues, personal activities, work, weddings, vacations, or University-sponsored events. Absences related to such activities should be discussed directly with the faculty member.

Should a student need assistance from the SASS office in verifying an emergency situation, they can submit an [online request form](http://sass.charlotte.edu/services/absence-verification) ([sass.charlotte.edu/services/absence-verification](http://sass.charlotte.edu/services/absence-verification)) and attach supporting documentation. Please note that students are not required to go through the SASS office at any time regarding absence verification, and the SASS office does not have the authority to excuse absences, allow for make-up work, or provide other academic accommodations.

In cases of absence due to **pregnancy or parenting** (pregnancy, childbirth, false pregnancy, termination of pregnancy, or recovery from any of these conditions), students should contact the [Office of Civil Rights and Title IX](#) to obtain absence verification by completing the [online form](#) at <http://bit.ly/332eaGd>.

#### Disability Accommodations:

Students in this course seeking accommodations to disabilities must first consult with the [Office of Disability Services](#) and follow the instructions of that office for obtaining accommodations.

#### Non-discrimination:

All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of [University Policy 406, The Code of Student Responsibility](#). Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

#### Academic Integrity:

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code and on the [Student Accountability & Conflict Resolution website](#). The Code is available from the Dean of Students Office or online at [legal.charlotte.edu/policies/up-407](http://legal.charlotte.edu/policies/up-407). Additional resources are available on the [Student Accountability & Conflict Resolution website](#).

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work.

#### Copyright:

Lectures and course materials, including presentations, tests, exams, outlines, and similar materials, are protected by copyright. The creators of the material are the exclusive owners of

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