

RESEARCH REPORT

Do No Harm Guide: Applying Equity Awareness in Data Visualization

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(4.2 MB)



Through rigorous, data-based analysis, researchers and analysts can add to our understanding of societal shortcomings and point toward evidence-based actions to address them. But when data are collected and communicated carelessly, data analysis and data visualizations have an outsized capacity to mislead, misrepresent, and harm communities that already experience inequity and discrimination.

For researchers and analysts to unlock the full potential of their data, they must apply an equitable lens to every step of the research process. Were the data collected responsibly, and do they accurately represent the communities surveyed? Do researchers allow for and incorporate community input? Does the final product consider equity and inclusion in its presentation? The answers to these questions will vary by project, and there is no one-size-fits-all approach. But for researchers to truly do no harm, they must build their work on a foundation of empathy.

In this guide and its associated toolkits, we focus on how data practitioners can approach their work through a lens of diversity, equity, and inclusion. We conducted over a dozen interviews with nearly 20 people who work with data to hear how they

approach inclusivity in their work. Our goal is not to prescribe what to do or not to do; rather, we want to encourage thoughtfulness in how analysts work with and present their data.

Data communicators should ground data analysis and communication in empathy

By approaching stories with empathy, researchers can build relationships and trust with the communities of focus and create more accurate and impactful visualizations and research. But applying empathy to data analysis and data visualization requires that researchers consider how the communities whose data are being used and the target audiences will perceive the work. Kim Bui, a journalist with the *Arizona Republic*, summarized this idea: "If I were one of the data points on this visualization, would I feel offended?"

Data visualization often reduces people to points on a map or bars on a chart, so framing and context that uplift the people and communities behind the data are necessary for data communicators to empathetically present their work. These steps should be taken in tandem with existing standards of rigorous research, and researchers should seek to work with communities rather than simply on behalf of them. By starting with empathy, sophisticated research methods, and community buy-in, data analysts can produce quality research that provides background context and points toward effective solutions and recommendations.

Applying an equity lens to data analysis and visualization

Although grounding data analysis and visualization in empathy can lead to more diverse, equitable, and inclusive results, data communicators should still be mindful of how data products can fail to use an equity lens. Some recommendations researchers and communicators should consider include the following:

- **Use people-first language.** Data labels and framing should start with the people behind the data, not their characteristics. Using labels such as "Black people" rather than "Black" is more inclusive and centers people, not their skin color. And a label such as "Percentage of people in poverty" refers to an experience rather than using a static description like "more poverty."
- **Order labels and responses purposefully.** Often, surveys and other data collection methods will order responses in ways that reflect historical biases. Rather than using orders that reinforce "white" and "male" categories as norms, consider ordering labels by sample size or magnitude of results.
- **Carefully consider colors, icons, and shapes.** In many visualizations, colors can be

associated with stereotypes (e.g., pink for women, blue for men) that can reinforce biased perceptions in readers. Similarly, images or icons can reinforce stereotypes (e.g., a woman as a nurse but a man as a doctor). In visualizations, images and colors can help readers connect with the data, but researchers should be mindful of their capacity to exacerbate stereotypes.

These recommendations are only effective if data communicators are willing to use them. By building diverse research teams, working closely with the communities being studied, and committing to more equitable data practices, researchers can engage in careful and critical data analysis while considering equity and inclusion.

To learn more about how you can see and understand the intersection of data and equity issues and use data to advocate for change, visit the [Racial Equity Data Hub from the Tableau Foundation](#).

[The Racial Equity in Data Visualization Checklist](#)

[Diversity, Equity, and Inclusion in Data Visualization: General Recommendations](#)

TAGS

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LGBTQ+ equity

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Course Information

- **Course number and title:** CGT 575 Data Visualization
- **CRN:** 32041
- **Meeting day(s) and time(s):** Virtual Office Hours by Request:
<https://outlook.office365.com/owa/calendar/Bookings-CGT575OfficeHours@purdue.edu/bookings/>
- **Instructional Modality:** Async-Online through Brightspace
- **Course credit hours:** 3

Instructor Contact Information

- **Name of the instructor:** Andrea Pluckebaum
- **Purdue Email Address:** apluckeb@purdue.edu (preferred)
- **Student consultation hours, times, and location:** My availability varies by week. Please email with questions anytime. Virtual Office Hours by Request (<https://outlook.office365.com/owa/calendar/Bookings-CGT575OfficeHours@purdue.edu/bookings/>)

Please use your official Purdue email address. Include “CGT 575” in your subject line. Emails will be responded to within one business day.

Within Brightspace, you can also add general questions for your classmates and I in the Course Q&A discussion board. Do not add answers to assignments or personal questions to this discussion. If you see a question in the discussion board that you can help with, add your insight.

Course Description

This course provides hands-on experience in data visualization tools and applications. The course is designed for students with little or no background in Data Visualization. It introduces students to design principles for creating meaningful displays of quantitative and qualitative data to facilitate insight and decision-making. The goal is to introduce visualization as a tool, explore and identify which visualization tools are better suited to visualize different types of data, and understand the role visualization plays in understanding what the data represent. This course gives students an in-depth view of the various branches of visualization and the visualization tools in each area. After taking the course students will be able to evaluate data visualization tools and determine which tool to use for different types of data. This course is targeted towards students interested in using visualization in their own work and future academic courses.

Learning Resources, Technology & Texts

- **Required texts and readings** are all available through Brightspace and can be accessed for free through Purdue libraries. You will need to log in using your career account.
 - Readings are included in each week’s module as well as listed in the PWL Reading List tool.
 - For full citations and the reading list, visit the Brightspace course.
- **Software Requirements:**
 - You will be using either Power BI or Tableau for this course. These are available for free through Purdue Software Remote.
 - Please login at your earliest convenience to ensure that you have access.
 - Instructions for installing Software Remote can be found in the Start Here module in Brightspace and at <https://it.purdue.edu/facilities/software/goremote.php>
 - If you need technology assistance, please contact [Purdue iTAP](#)
 - Remember that [MS Office is free for all students](#).
- Visit [Ask a Librarian](#) to connect with helpful resources and services provided by the Purdue Libraries and School of Information Studies for course assignments and projects.

- **Brightspace learning management system (LMS)**
 - Access the course via Purdue’s Brightspace learning management system. Begin with the Start Here tab, which offers further insight to the course and how you can be successful in it. It is strongly suggested that you explore and become familiar not only with the site navigation, but also with content and resources available for this course. See the Student Services widget on the campus homepage for resources such as Technology Help, Academic Help, Campus Resources, and Protect Purdue.

Learning Outcomes

By the end of the course, you will be able to:

1. Collect and process data, create an interactive visualization, and use it to demonstrate or provide insight into a problem, situation, or phenomenon.
2. Critique various visualizations and to identify design principles that make good visualizations effective.
3. Critically assess data visualization tools and determine which tool is the most appropriate for their needs.

Assignments

ITEM	WEIGHT
Individual Assignments	25%
<ul style="list-style-type: none"> • Week 1, Dear Data Postcard • Week 6, Storyboard • Week 7, Design Review Reflection 	
<i>The work submitted for these assignments represents your unique independent effort.</i>	
Group Assignments	25%
<ul style="list-style-type: none"> • Week 2, Iconic Visualization • Week 3, Chart Types • Week 4, More Chart Types • Week 5, Storytelling with Data 	
<i>The work submitted for these assignments will represent the collective effort of all members of your assigned group.</i>	
Weekly Discussion Board Posts and Responses	20%
Individual Project	20%
Final Exam	10%

Feedback on assessments, typically in the form of grades, will be returned within three days after the due date. Full details on requirements and rubrics for all assessments will be made available in the learning management system. All assessments will be submitted through the learning management system.

Grading Scale

In this class, grades reflect the sum of your achievement of learning outcomes throughout the semester. You will accumulate points as described in the assignments portion above, with each assignment graded according to a rubric. At the end of the semester, final grades will be calculated by adding the total points earned and weighting those scores in accordance with the assignments table above.

Grade	Percent
A+	≥97
A	<97 and ≥93
A-	<93 and ≥90
B+	<90 and ≥87
B	<87 and ≥83
B-	<83 and ≥80
C+	<80 and ≥77

C	<77 and ≥73
C-	<73 and ≥70
D+	<70 and ≥67
D	<67 and ≥63
D-	<63 and ≥60
F	<60

How to Succeed in this Course

If you want to be a successful student:

- Be self-motivated and self-disciplined.
- Be willing to speak up if problems arise.
- Access the resources that are available to you; reaching out for assistance is a critical life skill rather than an indication of weakness.
- Be willing and able to commit to 4 to 15 hours per week per course.
- Be able to communicate through writing.
- Be able to meet the minimum requirements for the course.
- Accept critical thinking and decision making as part of the learning process.
- Take advantage of resources such as those listed in our course Brightspace under Announcements regarding Technology, Academics, Campus Resources, etc.
- Review the University Policies content on our course Brightspace.

In contrast, here are some common behaviors that lead to failing the course.

- Delay reading until the night before the discussion.
- Wait until the last day to begin assignments.
- Forget about deadlines.
- Ignore emails from the instructor and/or your peers regarding course activities.
- Don't get familiar with the course Brightspace and syllabus.

Course Logistics

- You are encouraged to “mentally enroll” in this course. Our weeks will run from Saturday to Friday. I will post information (videos, readings, assignments, discussion posts, etc.) for the upcoming week by Friday evening so that when you log in on Saturday, you can begin the new week.
- All assignments are due by 11:59 PM ET on the due date listed in Brightspace.
- Deadlines are an unavoidable part of being a professional and this course is no exception. Course requirements must be completed and posted or submitted on or before the specified due date and delivery time deadline. Due dates and delivery time deadlines are defined as that used in West Lafayette, Indiana. To encourage you to stay on schedule, due dates have been established for each assignment; 20% of the total points will be deducted for assignments received 1-6 days late; assignments received more than 1 week late will receive 0 points.
- An assignment file should be appended by your username, such as “assignment1-kim53.doc.” This will make it easier for me to manage assignment files and provide feedback to you.

Attendance Policy

This is an asynchronous course with deadlines. You're expected to meet these deadlines and engage in the course throughout the 8-week semester. If you are unable to meet deadlines due to illness or other life circumstances, please contact me as soon as possible to make alternative arrangements.

If you must miss class at any point in time during the semester, please reach out to me via Purdue email so that we can communicate about how you can maintain your academic progress. For COVID-19 concerns, please see the [Fall 2022: What you need to know](#) guidance published July 27. If you find yourself too sick to progress in the course, notify your adviser and notify me via email or Brightspace. We will make arrangements based on your particular situation.

Netiquette

We want to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea, but you may not attack an individual. Our differences, some of which are outlined in the University's nondiscrimination statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Monitor how much space/time you are taking up in any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could lead to misinterpretation.
- Keep an “open-mind” and be willing to express even your minority opinion.
- Think and edit before you push the “Send” button.
- Seek and take in feedback from others; learning from other people is an important life skill.

Course Schedule

Check the Purdue [Academic Calendar](#) for important university dates and deadlines.

Week	Topic & Readings	Assignments
Week 1	Watch: <ul style="list-style-type: none"> • Course Introduction and Overview Read: <ul style="list-style-type: none"> • Dear Data: Feminist Information Design’s Resistance to Self-Quantification (Kienle) • Gartner Magic Quadrant for Analytics and Business Intelligence Platforms (Mitchell) 	<ul style="list-style-type: none"> • <i>Introduce Yourself</i> Survey (Take this <i>first</i> - We’ll use this data for Assignment 1) • Assignment 1 (Individual) • Discussion Post 1 and Responses
Week 2	Watch: <ul style="list-style-type: none"> • Early Data Visualizations • The Visual Display of Quantitative Information • Influence of Cognitive Psychology • Big Data & Present • Opening Tableau and/or Power BI Read: (Choose 1 tool and familiarize yourself with the reference material.) <ul style="list-style-type: none"> • Learning Tableau – Chapters 1 and 2 (Milligan) OR Pro Power BI Dashboard Creation – Chapters 1 and 2 (Aspin) 	<ul style="list-style-type: none"> • Assignment 2 (Group) • Discussion Post 2 and Responses
Week 3	Watch: <ul style="list-style-type: none"> • None Read: <ul style="list-style-type: none"> • #makeovermonday: Improving How We Visualize and Analyze Data – Chapters 9-12 (Murray & Kriebel) Choose the same tool from Week 2 and familiarize yourself with the following reference material.	<ul style="list-style-type: none"> • Assignment 3 (Group) • Discussion Post 3 and Responses

	<ul style="list-style-type: none"> Learning Tableau – Chapters 3 and 4 (Milligan) OR Pro Power BI Dashboard Creation – Chapters 6-9 and 12 (Aspin) 	
Week 4	<p>Watch:</p> <ul style="list-style-type: none"> Geospatial Visualizations Network Visualizations Scientific & Statistical Visualizations <p>Read:</p> <p>Choose the same tool from Week 2 and familiarize yourself with the following reference material.</p> <ul style="list-style-type: none"> Learning Tableau – Chapters 5-7 (Milligan) OR Pro Power BI Dashboard Creation – Chapters 13-15 (Aspin) 	<ul style="list-style-type: none"> Assignment 4 (Group) Discussion Post 4 and Responses
Week 5	<p>Watch:</p> <ul style="list-style-type: none"> Project Introduction <p>Read:</p> <ul style="list-style-type: none"> Storytelling with Data: A Data Visualization for Business Professionals – Chapters 1, 3, and 8 (Knaflic) 	<ul style="list-style-type: none"> Assignment 5 (Group) Discussion Post 5 and Responses
Week 6	<p>Watch:</p> <ul style="list-style-type: none"> Dashboard Tips: How to Whiteboard or Storyboard <p>Read:</p> <ul style="list-style-type: none"> Avoiding Data Pitfalls: How to Steer Clear of Common Blunders When Working with Data and Presenting Analysis and Visualizations – Chapters 6 and 9 (Jones) 	<ul style="list-style-type: none"> Assignment 6 (Individual) Discussion Post 6 and Responses
Week 7	<p>Watch:</p> <ul style="list-style-type: none"> Design Review Tips and Expectations <p>Read:</p> <ul style="list-style-type: none"> Do No Harm Guide: Applying Equity Awareness in Data Visualization (Schwabish and Feng) 	<ul style="list-style-type: none"> Design Review (Group Meeting) Assignment 7 (Individual) Discussion Post 7 and Responses
Week 8	No videos or readings this week.	<ul style="list-style-type: none"> Final Project Due Final Exam Due

* Schedule and assignments subject to change. Any changes will be posted in the learning management system.

Classroom Guidance Regarding Protect Purdue

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#) and the Violent Behavior Policy under University Resources in Brightspace.

Copyright

Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes (see the [Purdue University Copyright Office](#) website) Students may

not copy, reproduce, or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace under University Policies.

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor's discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

The Brightspace course includes a link to Purdue's Student Guide for Academic Integrity and to Use of Copyrighted Materials under University Policies content.

Nondiscrimination Statement

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue's full [Nondiscrimination Policy Statement](#) is included in our course Brightspace under University Policies.

Accessibility

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center (DRC) at: drc@purdue.edu or by phone at 765-494-1247.

The Student Resources widget in Brightspace provides links to the DRC.

Mental Health/Wellness Statement

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. The [CAPS website](#) also offers resources specific to situations such as COVID-19.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it relates to COVID-19, students may submit requests for emergency assistance from the [Critical Need Fund](#).

Other campus resources include:

- [ODOS services and information portal](#)
- [Student of concern reporting](#) (anyone on campus can submit a report if they are unsure where to go or in what way they can help a student - it does not need to be an emergency)
- The [ACE Campus Food Pantry](#) (open to the entire Purdue community)
- The [Center for Advocacy, Response & Education \(CARE\)](#) (open to the entire Purdue community) “provides support and advocacy for survivors of sexual violence, dating violence, and stalking.

Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

A link to Purdue’s Emergency Preparedness and Planning resources is located on the Brightspace shell under University Policies.

The [Campus Emergency Status](#) webpage is your primary online resource for current and developing PurdueALERT information and changes to the operational status of campus.

Diversity, Inclusion, and Belonging

1. In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:
 - We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if you have concerns about aspects of/experiences in the course.
 - Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker’s intention.
 - We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves.”
2. This course, as with every course offered at Purdue, plays a part in creating and sustaining a welcoming campus where all students can excel. There are many initiatives in ___ department and supported by the university focused on this goal, and this course is designed to take advantage of those resources. Learning experiences and assignments address diversity and inclusion, not because they are “topics,” but because they are necessary to prepare students to be successful in a diverse, global environment.
3. We strive for equity, providing equal access and opportunity, and working to maximize student potential. This requires both instructor and students to identify and remove barriers that may prevent someone from full access or full participation. You can help by:
 - Contacting me, anonymously if needed, if you see a potential barrier for someone or yourself in participating fully in the class. This might be a physical barrier such as access to technology or a personal situation.

- Suggesting ways in which members of our class can support each other. Virtual study groups and discussion boards are examples, but I encourage you to be creative in your ideas.
- Getting to know each other as contributing members of our learning community. Everyone has something to contribute, and while I designed the course to take advantage of the wealth of knowledge, expertise, and experience we bring together, I cannot do it well without your participation. There are many opportunities built into this course for this type of work. It is important we do it together.

Course Evaluation

Toward the end of this semester, you will be provided with an opportunity to give feedback on this course and your instructor. Purdue uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site and will receive a prompt to complete the survey when you login to Brightspace. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

Disclaimer

This syllabus is subject to change. You will be notified of any changes as far in advance as possible via an announcement on Brightspace. Monitor your Purdue email daily for updates.