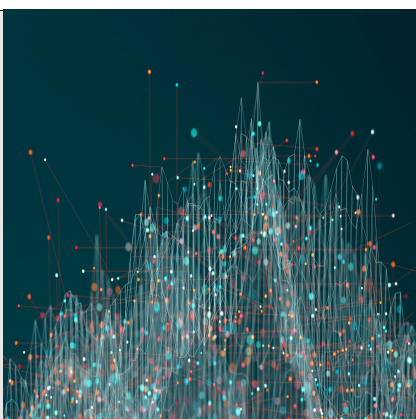**Data 201 – Data Visualization – Spring 2024**

Section 1
Meeting days: *Tuesday, Thursday*
Times: *8 – 9:20 am*
Location: *Taylor 200*

Section 2
Days: *Tuesday, Thursday*
Times: *9:30 – 10:50 am*
Location: *Taylor 200*

Instructor Information

Name	*Moses Luri*
Contact Info	*Email: mluri@wooster.edu [preferred method of contact]*
Office location	*Morgan Hall, Room 209*
Office hours	*Tuesday, Thursday: 1pm – 3pm [Or by appointment]*
Course Website	

Section 1 ZI Information

Name	*Greta Heiser*
Contact info	*Email: gheiser25@wooster.edu*
Office location	*Math center, Taylor 310*
Office hours	*Tuesday: 7-9pm and Thursday: 1-2pm*

Section II ZI Information

Name	*Fungi Jani*
Contact info	*Email: fjani24@wooster.edu*
Office location	*Math center, Taylor 310*
Office hours	*Monday: 4-5pm and Wednesday: 4-6pm*

Course Description

This course offers the foundations of information visualization. Students will sharpen their skills in communicating data through effective visualization. This will be achieved through individual effort and teamwork. We will use Tableau software to develop both static and interactive visualizations to tell stories from data of different types and structures. Additionally, we will discuss the ethics around reproducibility, data collection, and use of existing data sources for generating visualizations. Finally, students will work as "consultants" on a real-life project for a real company seeking data visualization services. With this opportunity, will have a first-hand experience of the application of data visualization beyond the classroom.

Pre-requisite

A first course in statistics or data science (AP Stats, DATA 102, MATH 329, ECON 110, BIOL 203, PSYC 250, DATA 106)
General Education Requirement: QL

Learning Objectives

Upon completion of this course, you will be able to:

i.	Identify and describe methods and techniques commonly used to describe data numerically and visually.
ii.	Explain, orally and in writing, what a data visualization is showing.
iii.	Provide an explanation for why the message portrayed in a visualization might be correct, but also identify possible sources of bias, problems with the analysis or assumptions behind the visualization.
iv.	Produce your own visualizations (univariate, multivariate, interactive, and animated plots), appropriate for different data types and analysis goals, using technology (tableau)
v.	Demonstrate the ability to clean and prepare data for the summarization and visualization process.
vi.	Conduct reproducible data analysis using real world data.
vii.	Identify the source(s) of a data set and discuss the ethical implications of the data collection, dissemination, and analysis.
viii.	Work both individually and as part of a collaborative team to achieve all the goals above.

Textbooks

All the following texts will be used in the course:

o Ben Jones. *Communicating Data with Tableau*. O'Reilly, 2014. (Link to text)
o Claus O. Wilke. *Fundamentals of Data Visualization*. O'Reilly, 2019. (Link to Text)
o Alberto Cairo. *The Truthful Art: data, charts, and maps for communication*. New Riders, 2016. (Link to text)
o Edward R. Tufte. *The Visual Display of Quantitative Information*. 2nd Ed. (Link to Text)

Note: All the above textbooks are available (digitally) for **free** through our library! You are certainly welcome to buy hard-copy versions, but this is not required. *The link to access these textbooks is learning.oreilly.com; note that you may have to create a (free) account with O'Reilly Safari Learning Platform (using your Wooster credentials).*

In addition to the course textbook readings, I will assign tutorial videos and other readings. Information on all these will be posted will be posted on Moodle.
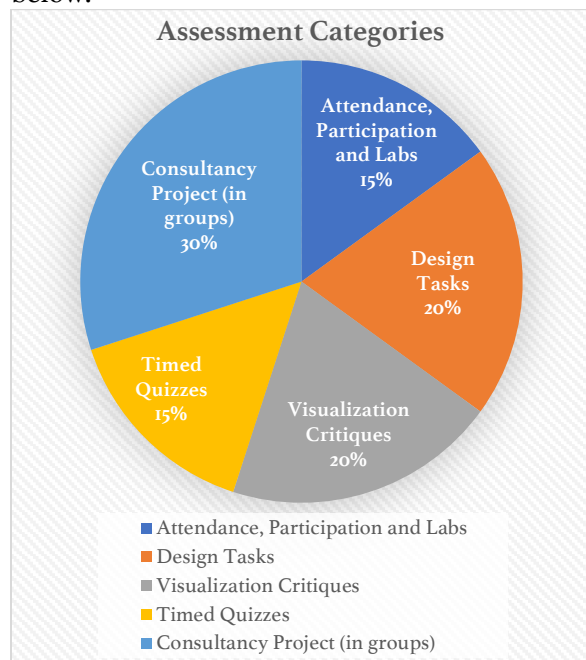
Software Requirements

While are many software for creating visualizations, in this course we will use *Tableau Desktop* and *Tableau Public*. Tableau is a leading industry standard for doing data visualization, as its drag-and-drop user interface is accessible to people who may be uncomfortable with command-line coding. It is also a powerful way to interact with data through the creation of dashboards.

Use the following LINK to download and request a year-long license for Tableau Desktop. Tableau Public is free for students for data visualization. (Click and follow this VIDEO to download and install Tableau Public)

Assessment and Grading

Your grade in course will be determined by your performance in the following assessment categories with respective weights charted below.

Assessment Categories

- Attendance, Participation and Labs 15%
- Design Tasks 20%
- Visualization Critiques 20%
- Timed Quizzes 15%
- Consultancy Project (in groups) 30%

At the end of the semester, the sum of points on all graded components outlined above will be utilized to assign letter grades using the grading scale below.

Grading Scale:	
A, A-	100 – 93, 92.99 – 90
B+, B, B-	89.99 – 87, 86.99 – 83, 82.99 – 80
C+, C, C-	79.99 – 77, 76.99 – 73, 72.99 – 70
D	69.99 – 60
F	<59.99

Attendance, Participation and Labs (15%)

The first few weeks of this course will be heavy on discussion. It is important that all students actively participate in these discussions. There will also be many in-class activities and labs. You must be in attendance to receive credit for any graded activities and labs.

Design Tasks (20%)

You will be assigned several design tasks which will involve conceiving and creating your own visualizations to summarize important aspects of a data set presented to you. Some design tasks will come with their own questions of interest, while others may require you to explore the data and visuals to answer questions of interest to you. Furthermore, other design tasks may require a nontrivial amount of data wrangling to get the data into a format suitable for visualizing. All design tasks will include an editing process during which your visualization is critiqued by at least 1 peer, and you will have a chance to edit your work using the feedback from your peer. No late work will be accepted.

Visualization Critiques (20%)

You will be assigned various visualizations to critique. This will entail critiquing the choice of visualization for a particular data, the message portrayed, assumptions and biases, the data source, potential ethical issues, and how you might improve upon the visualization. At the beginning of the semester, critiques will mostly be of visualizations I provide you. As the semester progresses, you will also critique your peers' visualizations. Becoming an effective critic is imperative for your own growth as a visualization designer; hence completing thorough critiques is a non-trivial component of your final grade. The instructor will provide you with a rubric to use when you critique your peers' visualizations.

Timed Quizzes (15%)

There will be periodic quizzes, to assess your understanding of readings and concepts discussed in class. Quizzes will typically be assigned outside class time but can be during class too. Some of the quizzes will be completed on Moodle, so you will need to have a device to complete them.

Consultancy Project (in groups) (30%)
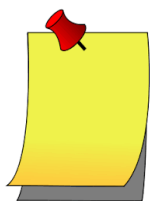
Beginning March 26 until the end of the course, you will work in teams as data visualization consultants for a real company seeking data visualization services. The project details, goals, and deliverables will be provided to you by a representative(s) of the company, who would also closely monitor your progress on the project via weekly or biweekly meetings. The project deliverables to the company at the end of the semester would one, two, or all of the following:

I. A 10 -15-minute presentation of your work as it pertains to accomplishing the project deliverables.
II. A detailed report providing analysis, insights, and recommendations base on your work.
III. A dashboard and short report on your findings and recommendations

All information, communication, and coordination of the consultancy project will be conducted on the following website: Link to Riipen Consultancy Project , which we will discuss and learn more about in class. Your score on this part of the course would consist of a "group effort" part and an "individual contribution" part. The "group effort" component would be based on the quality of work produced by the group throughout the project. While the "individual contribution" part would be based on team/group members evaluation of a student's contribution and participation. *Note: The two groups with highest scores on this group project work will automatically receive "A" in the course.*

Major Course Policies

Late-work policy: Due dates are non-negotiable unless prior permission is granted from the instructor. All late submissions if graded can only score up to 70% of the total.

Make-up work policy: No makeups will be given for any missed assessments in this course.

Re-grade policy: you may request a re-grade of your work only if an oversight on the part of the instructor is determined.

Attendance & Participation: This course is designed to be completed in-person and will take place at the scheduled day/time unless otherwise advised by the College. Class attendance is expected unless you are too ill to participate/concentrate, or have a compelling excuse backed by documentation. Students are expected to be on time for class and stay for the entire class period. If you miss a class, read the day's section(s) and get notes from a classmate, and review the day's activity or lab (on Moodle) *before* contacting me for help. Also remember that your groupmates are counting on your attendance! Participate fully in each class by coming prepared, being mentally focused, asking and responding to questions, and completing in-class activities*.

Maximum Class Absences: You may not miss more than *25% or 7 out of 27* class meetings, through any combination of excused and unexcused absences. If this occurs, the instructor will notify you, and if there are documented extenuating circumstances, the student may petition for a late course withdrawal.

Expectations

Reading Assignments: you are expected to read the required material before class and be prepared to discuss. Class will regularly contain discussions, interactive elements, and competitions.

Team player: you be working in teams through the semesters. Full team participation is expected and required of every student. Team members who work hard will gain wonderful team experiences and applied marketing knowledge.

Technology and Communication: All course materials will be posted to the course Moodle page. You are expected to *Check Moodle and your email daily*. Proper maintenance of computer accounts, files, etc. is your responsibility. I would like to stress that communication is key to success! This will hold true throughout your college career, work career, and really your entire life. <u>I implore you to contact me as soon as possible if you are struggling with material or if a conflict arises</u> (see "Conflicts with Academic Responsibilities" on the College Policies document).

Classroom Behavior: I expect you to be respectful in the classroom. I am happy to take any questions in class, no matter how trivial they may seem. To facilitate an open learning environment, every member of this class must show respect for every other member of this class. Listen when others are speaking and avoid distracting or rude behavior. At Wooster we embrace diversity of background, beliefs, ethnicity, gender, gender expression, national origin, religious affiliation, sexual orientation, and other visible and non-visible categories. I will not accept discrimination, offensive language or any other behaviors that may disrupt teaching and learning in the classroom.

Instructional Techniques

Instructional techniques in this course may include the following:

Discussions

Labs (Practice Sessions)

Team activities, assignments, and mini projects

Presentations

Tentative course schedule

Week	Days/Date	Topic	Chapter reading	Important Dates
		Part I: Theory **Principles of Effective Data Visualization**		
Week 1	Th, Jan 11	Welcome to Data 201, Syllabus, History of Data Viz		
Week 2	T, Th - Jan 16, 18	Communicating Data, six data viz design principles.	Jones Ch 1	
Week 3	T, Th - Jan 23, 25	Bad data viz, Good data viz, Color	Jones Ch1, Wilke Ch1, Wilke Ch2, Cairo Ch2	
Week 4	T, Th - Jan 30, Feb 1	Perception, Gestalt Principles, Other Design Principles	Wilke Ch4 & Ch19 Also see Moodle for links to additional reading	
		Part II: Viz Design **Visualizing univariate, aggregated, and multivariate data**		
Week 5	T, Th - Feb 06, 08	Intro to Tableau		
Week 6	T, Th – Feb 13, 15	Viz of "how much" and "how many"	Jones Ch2&3	
Week 7	T, Th – Feb 20, 22	Viz of relative amounts ("how much per"): ratios and rates, and proportions and percentages	Jones Ch4&5	
Week 8	T, Th – Feb 27, 29	Viz of measures of *mean*, *median*, and *mode (normal plots, box plots),* Viz of *variation* and *uncertainty* in data	Jones Ch6&7	
Week 9	T, Th – Mar 05, 07	Communicating multiple quantities in the same view (Stacked bar charts, Scatter plots, Quadrant Charts)	Jones Ch8	
		SPRING BREAK		Mar 08 – Mar 24
		Part III: Viz Design/Consultancy Project **Visualizing spatial & temporal data, and Dashboard Creation**		
Week 10	T, Th – Mar 26, 28	Consultancy project begins. Viz of how quantities and events change over time (Line Charts)	Jones Ch9	
Week 12	T, Th – Apr 02, 04	Consultancy project update Using maps to communicate positional data, Producing advanced maps (with shapes)	Jones Ch10&11	
Week 13	T, Th – Apr 09, 11	Consultancy project update Building dashboards to combine several visualizations	Jones Ch12&13	
Week 14	T, Th – Apr 16, 18	Consultancy project update Advance Dashboard features	Jones Ch14	
Week 15	T, Th – Apr 23, 25	Consultancy project update Information Graphics, Ethical data collection and privacy	See Moodle for links to reading	
Week 16	T, Th – Apr 30, Mar 2	Final presentations (in groups)		Consultancy project due Mar 29

Although every effort has been made to make this syllabus as complete as possible, changes may occur regarding schedule, grading, assignments, and office hours. The instructor reserves the right to make changes to this syllabus if it is deemed necessary. Any such changes will be communicated to you in a timely manner and posted on Moodle.

COLLEGE POLICIES:

Academic Integrity

I encourage students to exchange ideas and discuss problems. However, for assignments to be turned in, it will be considered plagiarism if a student copies the work of another. Anything taken from another source, such as another textbook or the internet, *must* be properly cited – failure to do so is plagiarism. On exams or quizzes the giving or receiving of any aid is not permitted. **Our ideas are the most valuable things we have – do not steal them from others.**

The academic program at the College seeks to promote the intellectual development of each student and the realization of that individual's potential for creative thinking, learning, and understanding. In achieving this, each student must learn to act rigorously, independently, and imaginatively.

The College's understanding and expectations in regard to issues of academic honesty are fully articulated in the Code of Academic Integrity as published in The Scot's Key and form an essential part of the implicit contract between the student and the College. The Code provides framework at Wooster to help students develop and exhibit honesty in their academic work. You are expected to know and abide by these rules.

Dishonesty in any of your academic work is a serious breach of the Code of Academic Integrity and is ground for serious penalties. Such violations include turning in another person's work as your own, copying from any source without proper citation, violating expectations for a group project, submitting an assignment produced for a course to a second course without the authorization of all the instructors, and dishonesty in connection with your academic work. You will be held responsible for your actions. Particular attention should be directed to the appropriate use of materials available online. Whether intentional or not, improper use of materials is a violation of academic honesty. If you are unsure as to what is permissible, please contact your course instructor.

The Wooster Ethic

I hereby join this community with a commitment to the Wooster Ethic upholding academic and personal integrity and a culture of honesty and trust in all my academic endeavors, social interactions, and official business of the College. I will submit only my own original work, and respect others and their property. I will not support by my actions or inactions the dishonest acts of others. (*THE SCOT'S KEY*, p. 60)

Conflicts with Academic Responsibilities

The College of Wooster is an academic institution, and its fundamental purpose is to stimulate its students to reach the highest standard of intellectual achievement. As an academic institution with this purpose, the College expects students to give the highest priority to their academic responsibilities. When conflicts arise between academic commitments and complementary programs (including athletic, cultural, educational, and volunteer activities), students, faculty, staff, and administrators all share the responsibility of minimizing and resolving them.

As a student you have the responsibility to inform the faculty member of potential conflicts as soon as you are aware of them, and to discuss and work with the faculty member to identify alternative ways to

fulfill your academic commitments without sacrificing the academic integrity and rigor of the course.

Title IX Reporting Policy Regarding Sexual Misconduct, Harassment, Relationship Violence, and Stalking
Contact: Lori Makin-Byrd, lmakin-byrd@wooster.edu, (330) 263-2017, Title IX website
The College of Wooster is committed to fostering a campus community based on respect and nonviolence. To this end, we recognize that all Wooster community members are responsible for ensuring that our community is free from discrimination, gender bias, sexual harassment, and sexual assault. In accordance with Title IX, Wooster is legally obligated to provide supportive options for all reports of sexual harassment and sexual assault that occur on our campus. Faculty who become aware of an incident of sexual violence, including harassment, rape, sexual assault, relationship violence, or stalking, are mandated reporters at the College and are required to notify Wooster's Title IX Coordinator. The purpose of this disclosure is to ensure that students are made aware of their reporting options and resources for support. For more information about your rights and reporting options at Wooster, including confidential and anonymous reporting options, please visit https://inside.wooster.edu/title-ix/

Discriminatory or Bias-Related Harassment Reporting Policy
Contact: Kayla Campbell, kcampbell@wooster.edu; or visit the Bias Reporting website
The College of Wooster is committed to promoting its mission of inclusivity and equity in all aspects of the educational enterprise. This commitment extends to all rights, privileges, programs and activities, including housing, employment, admissions, financial assistance, and educational and athletic programs at the College. The College's Bias Incident Reporting Process is designed to effectively respond to bias concerns raised by faculty, students, staff, alumni and visitors to the College. If you or someone you know are the victims of bias, you can:
- File a report online (where you may choose to identify yourself or not)
- Contact Campus Safety: 2590 (from campus phone) or 330-263-2590
- Call the Anonymous Tip Line: 2337 (from campus phone) or 330-263-2337
- Contact the Dean of Students Office: 2545 (from a campus phone) or 330-263-2545
- Contact the Chief Diversity, Equity, and Inclusion Officer representative for students: Kayla Campbell, kcampbell@wooster.edu, 330-263-2607

Inclusive Academic Resource Center: Academic Support and Disabilities
Contact: Amber Larson, alarson@wooster.edu, (330)263-2595, ARC Website
The Academic Resource Center, which is in APEX (Gault library) offers a variety of academic support services, programs and 1:1 meetings available to all students. Popular areas of support include time management techniques, class preparation tips and test taking strategies. In addition, the Academic Resource Center coordinates peer-tutoring for several academic departments. Students are encouraged to schedule an appointment.

An additional support that the Academic Resource Center offers is English Language Learning. Students can receive instruction or support with English grammar, sentence structure, writing, reading comprehension, reading speed, vocabulary, listening comprehension, speaking fluency, pronunciation, and American culture through 1:1 meetings with the Academic Resource Center staff, ELL Peer Tutoring, ELL Writing Studio courses, and other programming offered throughout the year.

The Academic Resource Center also coordinates accommodations for students with diagnosed disabilities. At the beginning of the semester, students should contact the Academic Resource Center to make arrangements for securing appropriate accommodations. Although the Academic Resource Center will notify professors of students with documented disabilities and the approved

Inclusive Learning Statement

Your success in this course is important to me. If there are circumstances that may affect your academic performance or impact your learning in particular portions of the class, please let me know as soon as possible. You do not need to share specifics, but together we can develop strategies to meet both your needs and the requirements of the course. I encourage you to visit the Academic Resource Center to determine how you could improve your learning as well. If you need official accommodations, the ARC can work with you to make sure your needs are met. There are also a range of resources on campus, including the Writing Center, Math Center, STEM Success Initiative, and APEX.

It is also important that we all be respectful of everyone's privacy around health concerns, vaccination status, and any accommodations that are necessary in the classroom. It is not appropriate to question why someone requests physical distancing, chooses to wear a mask, or requires any other accommodations. As part of our participation together in this class, we commit to showing respect to each other as individuals, to working together to create a learning environment that fosters a sense of belonging and inclusion to all members, and to understanding that our differences are also strengths. Your suggestions are encouraged and appreciated, and please contact me—via email, office hours, or after class—if you have any concerns or questions.

Wellbeing at Wooster

Contact (24/7): (330) 263-2319, or visit the Wellness Center website
The College of Wooster is committed to supporting the wellbeing of our students. During the course of their academic careers, students experience challenges that may interfere with their learning & health (both physical and mental), including but not limited to: strained relationships, adjusting to a new environment, chronic worrying, persistent sadness or loss of interest in enjoyable activities, family conflict, grief and loss, domestic violence, unwanted sexual experiences, difficulty concentrating, drug/alcohol problems, significant changes in eating and sleeping patterns, microaggressions, challenges with organization, procrastination and/or lack of motivation. Counseling Services at the Longbrake Student Wellness Center is a free and confidential resource providing short-term counseling and connections to community agencies for students needing longer term or specialized resources. You can make an appointment by calling 330.263.2319 between 8:30am-4:30pm during weekdays or by emailing Lori Stine (lstine@wooster.edu). You can also find helpful resources on the Counseling Services website at https://inside.wooster.edu/health/counseling/.

Students also have free access to TimelyCare, a telehealth service providing scheduled medical and counseling appointments as well as 24/7 crisis consultation with licensed professionals. Students use their Wooster email to establish an account at TimelyCare: Telehealth for Scots. TimelyCare also provides students access to nutritionists and health coaches about issues of sleep and exercise, and psychiatry (with a referral from doctor or counselor).

If you or a friend is in crisis, please call Campus Safety at 330-287-3333 or the National Suicide Prevention Lifeline (1-800-273-TALK) or connect with the Crisis Text Line by Texting "4HOPE" to 741-741.

For financial concerns: Dean of Students Office, dos@wooster.edu (330) 263-2545, DoS website
For safety concerns: Campus Safety 330-263-2590 or cow-security@wooster.edu, Campus Safety website. **In the care of an emergency, call: 330-287-3333.**