



Course title:	Data Visualization
Course #/term:	672, 001, Fall, 2020
Time and place:	Friday, 2-5, Hybrid Format
Credit hours:	3
Instructor:	Andy Grogan-Kaylor, MA, MSSW, PHD, Professor of Social Work
Pronouns:	he, his, him
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The First Book

Open it.

Go ahead, it won't bite.
Well ... maybe a little.

More a nip, like. A tingle.
It's pleasurable, really.

You see, it keeps on opening.
You may fall in.

Sure, it's hard to get started;
remember learning to use

knife and fork? Dig in:
you'll never reach bottom.

It's not like it's the end of the world—
just the world as you think

you know it.

— Rita Dove

Why can't numbers be beautiful too?

We all talk of beautiful words, art, buildings
and they're not part of the natural world, either.
An x in Algebra is no more abstract than
an idea in philosophy, just more useful.

... Of course,
I know there is no great beauty in a single number,
in a four or a seven or an eight, but it is the same
with the alphabet. Where is the wonder in a b
or a k or a t? It is only the combinations,
the meanings, the relationships between
the letters that make the words and sounds we love.

— And so, why can't my numbers be beautiful to me?
Why the scorn, the doubt in your face? Do you think I
am brittle and dusty as old paper?
Look again. See the numbers shine in my eyes.

— Eveline Pye

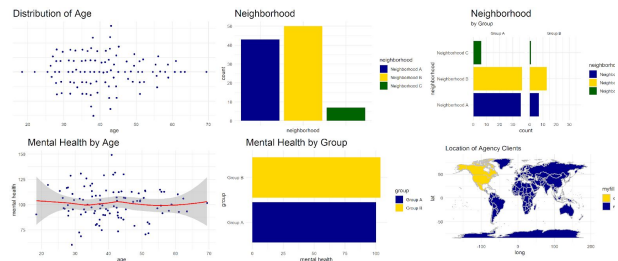


Figure 1: Dataviz Example

COVID-19 Statement

For the safety of all students, faculty, and staff on campus, it is important for each of us to be mindful of safety measures that have been put in place for our protection. By returning to campus, you have acknowledged your responsibility for protecting the collective health of our community. Your participation in this course on an in-person/hybrid basis is conditional upon your adherence to all safety measures mandated by the state of Michigan and the University, including maintaining physical distancing of six feet from others, and properly wearing a face covering in class. Other applicable safety measures may be described in the [Wolverine Culture of Care](#) and the [University's Face Covering Policy for COVID-19](#). Your ability to participate in this course in-person/hybrid may be impacted by failure to comply with campus safety measures. Individuals seeking to request an accommodation related to the face covering requirement under the Americans with Disabilities Act should contact the [Office for Institutional Equity](#). If you are unable or unwilling to adhere to these safety measures while in a face-to-face class setting, you will be required to participate on a remote basis. I also encourage you to review the [Statement of Student Rights and Responsibilities](#) and the [COVID-related Addendum to the Statement of Student Rights and Responsibilities](#).

Health-Related Class Absences

Please evaluate your own health status regularly and refrain from attending class and coming to campus if you are ill. You are encouraged to seek appropriate medical attention for treatment. School of Social Work students who miss class due to illness of any kind will be given opportunities to access course materials online or provided with alternative learning opportunities. Please notify me by email about your absence as soon as practical, so that I can make accommodations. Please note that documentation (a Doctor's note) for medical excuses is *not* required.

Recording Class

Audio and video recording of in-class lectures and discussions is prohibited without the advance written permission of the instructor. Students with an approved accommodation from the Office of Services for Students with Disabilities permitting the recording of class meetings must present documentation to the instructor in advance of any recording being done. The instructor reserves the right to disallow recording for a portion of any class time where privacy is a special concern. If the instructor chooses to record a class, they will decide which classes, if any, are recorded, what portion of each class is recorded, and whether a recording is made available on the course management website. On days when classes are recorded, students will be notified in advance that a recording will occur and be provided with an option to opt-out. Class recordings and course materials may not be reproduced, sold, published or distributed to others, in whole or in part, without the written consent of the instructor.

1. Course Statement

a. Course description

In an era of evidence based practice, community workers, advocates, and evaluators will likely find that they need to interpret and visualize data from a wide variety of sources. Understanding, interpreting and visualizing data (including learning R coding) can make the difference in successfully or unsuccessfully advocating for communities, clients or programs, and for understanding the impact of programs on clients. Increasingly, data relevant to community, participant and client well-being are available from a broad range of sources, whether those be databases of volunteers and donors, the Census, the World Bank, in addition to many others. This section of SW 672 will be focused on the acquisition of concrete applicable skills and strategies for interpreting and visualizing community data, including learning in R, Tableau and QGIS.

b. Course content

Students will learn some of the major analytic and quantitative tools used by practitioners in assessing or evaluating human service programs or systems, which include a range of specific programs. The theme of this course is how to increase the rationality of the planning, analysis, and evaluation process, particularly of programs intended to serve the underprivileged or oppressed populations. Students will learn that human service organizations include a wide variety of programs of diverse size and complexity, with respect to their activities and goals. This course will impart skills which can be applied at various levels of analysis in different contexts.

c. Course objectives and competencies

Upon completion of the course, students will be able to:

- 1) Demonstrate beginning level competence in the use of some major analytical tools that are most commonly used to assess and evaluate complex systems of services.
- 2) Demonstrate in-depth knowledge of two analytical tools and their application in the human services field.
- 3) Identify the limitations of rational analysis and be able to determine when rational choice processes are desirable and feasible to use.
- 4) Discuss typical ethical concerns related to the use of analytic methods in social policy practice. Describe ways in which diversity dimensions such as "ability, age, class, color, culture, ethnicity, family structure, gender (including gender identity and gender expression), marital status, national origin, race, religion or spirituality, sex, and sexual orientation, as well community of residence" have an effect on the analytical tools that are most commonly used to assess and evaluate complex systems of services.

d. Course design

The instructor will use lecture and discussion with students working in teams on contemporary issues. In addition, the instructor will include participatory discussion, written assignments and experiential exercises related to course materials.

e. Curricular themes

- **Multiculturalism and Diversity:** Students will develop the capacity to identify ways in which diversity dimensions such as "ability, age, class, color, culture, ethnicity, family structure, gender (including gender identity and gender expression), marital status, national origin, race, religion or spirituality, sex, and sexual orientation, as well community of residence" and other forms of social stratification and disenfranchisement influence and are impacted by the social policy practice process.
- **Social Justice and Social Change:** This course will provide students with the capacity to participate in the social policy process and the ability to approach policy analytically by virtue of social work practice and ethics. Students will learn that social work practice and ethics play an important role in shaping the outcome of ongoing policy debates to reflect issues in social justice and change.
- **Promotion, Prevention, Treatment, and Rehabilitation:** Students will learn that policies in human services are too often implemented in reaction to an issue, not proactively, due to changing social, economic, and political circumstances and influences. Promotion, prevention, treatment, and rehabilitation activities are difficult to evaluate and therefore raise special challenges in social policy implementation. Students will be exposed to innovative evaluation techniques (e.g., forecasting and simulation models) that can be used to analyze and evaluate promotion, prevention, treatment, and rehabilitation activities prior to the development, implementation, and analysis of any relevant policy issue or initiative.
- **Behavioral and Social Science Research:** Policies in human services are in a constant state of flux owing to changing social, economic, and political circumstances. Thus, any review of existing policy may be quickly outdated and has limited use as part of the training social work students carry into their careers. Therefore, students will be provided with social science models and theories that can be used as tools to analyze and evaluate any policy issue encountered in the course of their professional activities. Examples of the use of social science in policy development will be presented (e.g. Coleman report on education).

f. Relationship to social work ethics and values

Ethical standards of social work practice (e.g. possibly NASW Code of Ethics) and evaluation practice (Program Evaluation Standards) will be used to review issues commonly confronted in evaluation practice. The ethical themes of autonomy, beneficence, nonmaleficence, fidelity, and justice will be particularly emphasized and discussed.

2. Class Requirements

a. Text and class materials

Since the focus of this course is on the practical doing of policy and evaluation work with software tools such as R, Tableau, and QGIS, there may be fewer readings than you are accustomed to. There is no textbook for the course. All readings are available online through <http://canvas.umich.edu>.

Software (you do not need to purchase any software for this course)

R (available for free download from <http://www.r-project.org/> and already installed in most campus computer labs) (in class exercises will focus on the use of R although the statistical concepts covered transcend any one statistical software package)

QGIS (available from <https://qgis.org> and in campus computer labs) (in class GIS exercises will focus on the use of QGIS).

Tableau (<https://www.tableau.com/>) (instructor will procure student licenses)

b. Class schedule

Course schedule is appended to the end of the syllabus.

c. Assignments

Assignments are described in brief below. More details (i.e. a template) for each assignment will be forthcoming as the semester progresses. **However, please pay close attention to the cross-cutting criteria listed below.**

Name of Assignment	Percentage of Grade
Base R graph + ggplot2 graph	15%
Rmarkdown Assignment	15%
Tableau viz	15%
Maps	15%
Final portfolio assignment	15%
Class participation. (Styles of class participation vary greatly, but some credit will be given for your overall engagement in the classroom)	25%

d. Grading

I will employ the standard grading scheme employed by <http://canvas.umich.edu>.

Name:	Range:	
A	100 %	to 94.0%
A-	< 94.0 %	to 90.0%
B+	< 90.0 %	to 87.0%
B	< 87.0 %	to 84.0%
B-	< 84.0 %	to 80.0%
C+	< 80.0 %	to 77.0%
C	< 77.0 %	to 74.0%
C-	< 74.0 %	to 70.0%
D+	< 70.0 %	to 67.0%
D	< 67.0 %	to 64.0%
D-	< 64.0 %	to 61.0%
F	< 61.0 %	to 0.0%

Cross-cutting criteria for grading: Some amount of your grade will be based upon your attention to matters of design and clarity. For example, the names of indicators or variables should be spelled out, as should the titles and labels for graphs and maps. For the optional final portfolio, you should devote some time to thinking about other design elements, like the use of a one or two relevant stock photos as well as intentional and thoughtful choices about

color palette, line weight, point shape, etc.

(<https://agrogan1.github.io/newstuff/SW672/grading-rubric.html#1>)

Plagiarism—when discovered—will be dealt with severely. Please note that for purposes of this course, plagiarism consists of six or more consecutive words, taken from another source without proper attribution. Failure upon my part to detect plagiarism does not imply approval of plagiarism.

A note on work handed in late: Most students work very hard to turn in work in accordance with class deadlines. In order to be fair to the majority of students, I have developed the following policy: late work will be graded down by half a grade a day unless prior arrangements for an extension have been made with me. I very much understand that extenuating circumstances may arise which make it difficult to turn in work on time. All I am asking you to do is to communicate with me if you need some kind of extension so that we can work out an arrangement that is mutually agreeable.

Additional School and University policies, information and resources are available here: <https://ssw.umich.edu/standard-policies-information-resources>. They include:

- *Safety and emergency preparedness*
- *Mental health and well-being*
- *Teaching evaluations*
- *Proper use of names and pronouns*
- *Accommodations for students with disabilities*

If you have a disability or condition that may interfere with your participation in this course, please schedule a private appointment with me as soon as possible to discuss accommodations for your specific needs. This information will be kept strictly confidential. For more information and resources, please contact the Services for Students with Disabilities Office at G664 Haven Hall, (734) 763-3000.

- *Religious/spiritual observances*
- *Military deployment*
- *Writing skills and expectations*
- *Academic integrity and plagiarism*

Week	SW 670 Date	Software	SW 670 Topic	SW 670 Readings	SW 670 Assignments
1	9/4/2020		Introduction to Course		
2	9/11/2020	R	Getting up and Running in R (installing the program; starting the program; importing data; making a graph in Base R)	<p>For an overall sense of why seeing patterns in data is important, please listen to "When Helping Hurts" podcast.</p> <p>Introduction to R</p> <p>Screencast on Installing R</p> <p>Please note, in some of my online materials—including the installation video—I discuss the use of Rcommander, a menu based system for R, whose use I now generally discourage. Relying on Rcommander will likely lead to unsuccessful completion of this course.</p>	Tell me about the basic question you intend to follow over the course of the semester. Where will you find data? (online form via Canvas)
3	9/18/2020	ggplot2	The grammar of graphics and ggplot2	Introduction to ggplot Two Page ggplot	
4	9/25/2020		Lab Day		Base R graph + ggplot2 graph at end of day Friday
5	10/2/2020	Rmarkdown	Literate programming: Rmarkdown for reproducible results and dissemination	https://rmarkdown.rstudio.com/lesson-1.html https://rmarkdown.rstudio.com/lesson-2.html https://rmarkdown.rstudio.com/lesson-3.html https://rmarkdown.rstudio.com/lesson-8.html https://rmarkdown.rstudio.com/lesson-9.html	

6	10/9/2020	Review of Rmarkdown, animated graphics with plotly.	TBD	Review of above. Plotly link TBD	
7	10/16/2020		Lab Day		Rmarkdown document, preferably on the web that includes 3 consistently ggplot2 graph(s) due at end of day Friday. Include some rationale as to what you graphed, why, and the design choices that you made.
8	10/23/2020	Class Choice of Advanced Topics: ★★★ (1) Visualizing Data With Stata (2) Advanced RMarkdown (Dashboards) (3) Cleaning Messy Data With R			
10	10/30/2020	QGIS	QGIS 1	TBD	
11	11/6/2020	QGIS	QGIS 2	TBD	
12	11/13/2020	QGIS 3 or Advanced RMarkdown output or both	Geoprocessing		
13	11/20/2020	Video Introduction to tableau and iNZight	Tableau and iNZight		

14	11/27/2020	Thanksgiving Break			
15	12/4/2020		Lab Day		Map and Tableau graph due at end of day Friday
					OPTIONAL Rmarkdown Portfolio = Base R graph + ggplot2 graph + map due one week after end of class