



# SCHOOL OF SOCIAL WORK

UNIVERSITY OF MICHIGAN

<b>Course title:</b>	Data Visualization
<b>Course #/term:</b>	672, 001, Winter, 2021
<b>Time and place:</b>	Wednesday, 9-12, Online Format
<b>Credit hours:</b>	3
<b>Instructor:</b>	Andy Grogan-Kaylor, MA, MSSW, PHD, Professor of Social Work
<b>Pronouns:</b>	he, his, him
<b>Contact info:</b>	<b>Email:</b> <a href="mailto:agrogan@umich.edu">agrogan@umich.edu</a> (best) <b>Phone:</b> 734-615-3369 You may usually expect a response within 24 hours
<b>Office:</b>	3846 SSWB
<b>Office hours:</b>	TBD

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

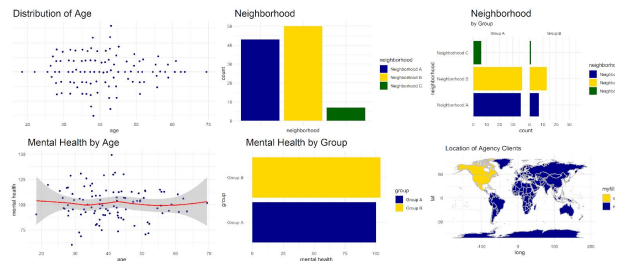


Figure 1: Dataviz Example

### **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**

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### **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 some basic 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 course 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. Some learning of basic coding in R will be involved in this course.

## 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. Locate and identify sources of data for different types of data visualization.
2. Learn how distinctions between categorical and continuous variables drive data visualization decisions.
3. Understand and implement a \*grammar of graphics\* to create various forms of data visualization.
4. Apply principles to produce various forms of standard graphs and data visualizations.
5. Apply principles to produce various types of maps and visualizations of spatial data.

## 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. In general, the course will have the following structure: 9-10: Asynchronous viewing of recorded materials; 10-11:30: Lecture, discussion and group activities.

## 2. Class Requirements

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### 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	20%
Rmarkdown Assignment	20%
Tableau viz	15%
Maps	15%
Optional Final portfolio assignment	0%
Class participation. (Styles of class participation vary greatly, but some credit will be given for your overall engagement in the classroom) (Some %age of this grade will be attached to participation in Canvas Discussion Threads)	30%

#### 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. 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.

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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 672 Date	Software	SW 672 Topic	SW 672 Readings	SW 672 Assignments
1	1/20/2021		Introduction to Course		
2	1/27/2021	<b>R</b>	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 <b>discourage</b>. 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	2/3/2021	<b>ggplot2</b>	The grammar of graphics and ggplot2	Introduction to ggplot Two Page ggplot	
4	2/10/2021		<b>Lab Day</b>		Base R graph + ggplot2 graph at end of day Friday
5	2/17/2021	<b>Rmarkdown</b>	Literate programming: Rmarkdown for reproducible results and dissemination	<a href="https://rmarkdown.rstudio.com/lesson-1.html">https://rmarkdown.rstudio.com/lesson-1.html</a> <a href="https://rmarkdown.rstudio.com/lesson-2.html">https://rmarkdown.rstudio.com/lesson-2.html</a> <a href="https://rmarkdown.rstudio.com/lesson-3.html">https://rmarkdown.rstudio.com/lesson-3.html</a> <a href="https://rmarkdown.rstudio.com/lesson-8.html">https://rmarkdown.rstudio.com/lesson-8.html</a> <a href="https://rmarkdown.rstudio.com/lesson-9.html">https://rmarkdown.rstudio.com/lesson-9.html</a>	

	2/24/2021	Well Being Break			
6	3/3/2021	Review of Rmarkdown, animated graphics with plotly.	TBD	Review of above. Plotly link TBD	
7	3/10/2021		<b>Lab Day</b>		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	3/17/2021	<b>Class Choice of Advanced Topics:</b> <b>★★★</b> (1) Visualizing Data With Stata (2) Advanced RMarkdown (Dashboards) (3) Cleaning Messy Data With R			
10	3/24/2021	<b>QGIS</b>	QGIS 1	TBD	
11	3/31/2021	<b>QGIS</b>	QGIS 2	TBD	
12	4/7/2021	<b>QGIS 3</b> or <b>Advanced RMarkdown</b>	Geoprocessing		



		<b>output</b> or <b>both</b>			
13	4/14/2021	Video Introduction to <b>tableau</b> and <b>iNZight</b>	<b>Tableau and iNZight</b>		
15	4/21/2021		<b>Lab Day</b>		Map and Tableau graph due at end of day Friday
					<b>OPTIONAL</b> <b>Rmarkdown</b> Portfolio = Base R graph + ggplot2 graph + map due one week after end of class