PAI 724: Data Driven Decision Making

Fall Term 2022

Instructor	**Contact Information**	**Office Hours**
Saba Siddiki, PhD Associate Professor Public Administration and International Affairs	Center for Policy Research 426 Eggers Hall, Syracuse T: 315-443-4589 E: ssiddiki@syr.edu	Mondays 12:30-1:30pm By Zoom (see link below)
Co-Instructor		
Graham Ambrose PhD Student Public Administration and International Affairs	Center for Policy Research 426 Eggers Hall, Syracuse E: grambros@syr.edu	Fridays 11:00am-12:00pm By Zoom (see link below)

Zoom Links for Office Hours
Link for Siddiki office hours:

Link for Ambrose office hours:

Class Day, Time, and Location
Class will be held Mondays from 9:30am-12:15pm in Eggers 040

Course Description, Objectives, and Competencies
Leading and managing in any organization to address public sector challenges has always required the ability to effectively synthesize, analyze, and critically evaluate data within complex and dynamic contexts. But today's evolving data environment requires an augmented set of data competencies for leaders and managers. What are some of the features of this evolving data environment, and what sets of competencies do they prompt? In part, this evolving environment is one in which data previously deemed intractable can now be effectively collected, stored, and analyzed. It is also one in which computational techniques are increasingly used for data analysis and decision making based on different forms of data. Sometimes these techniques are built on decision heuristics that are fundamentally different than those engaged by humans. To effectively navigate this evolving data environment, leaders and managers must be able to:

- Demonstrate understanding of complexities involved in public sector decision making
- Convey understanding of evolving data trends
- Demonstrate understanding of computational thinking and perspectives that undergird computational tools and techniques increasingly used to inform public sector decision making

- Use, at least at a basic level, computer programming software increasingly relied on to perform data tasks
- Assess and communicate the qualities and biases associated with data used in policymaking and public organizations
- Use decision frameworks and heuristics for guiding choices about the appropriate use of different kinds of data and analytical techniques
- Reference and draw upon research and practice that addresses data driven decision making

To support students' mastery of competencies across the data analytics life cycle, this course will:

- Highlight complexities of public sector decision making
- Introduce students to computational thinking
- Introduce students to basic programming in Python
- Introduce students to data management and visualization in R
- Introduce students to data management and visualization in Tableau
- Provide students with an overview of data fundamentals, including: types of data, data bias, data quality, data measurement, data management, and data communication
- Review cases and strategies relating to data driven decision making

Course Materials

There are two required texts for this course (text information below), one of which needs to be rented or purchased by the student, and one of which is freely available (i.e., in publicly available E-book format). In addition to the course texts listed below, students will read a mix of academic journal articles, government reports, professional reports, and web-based resources relating to topics covered in the course. These additional readings are posted on the course Blackboard site or referenced in this syllabus. Reading assignments are listed in the course schedule included in this syllabus.

Required Texts

- Kettl, Donald F. 2018. *Little Bites of Big Data for Public Policy*. Thousand Oaks, CA: CQ Press.
- Severance, Charles. 2016. *Python for Everybody: Exploring Data in Python 3.* Free E-book version available at: https://www.py4e.com/book

Class Meeting Format

Class sessions will be held in person in a lecture-lab format. This means each class period will be split into two parts. The first (lecture) part of each class will involve lecture and class discussion relating to overarching topics of data driven decision-making for public administrators. The second (lab) part of each class will consist of a data and programming lab, where Python, R, and tableau tutorials will be provided to students, and in which students will have an opportunity to apply skills covered in tutorials directly. Please note that the course meeting format may change during the fall term per the instructor's, PAIA's, or University's discretion, and in light of evolving circumstances relating to COVID-19.

Assignments and Exams
Students will earn points in this course based on their performance on data and computing assignments and a final project. Data and computing assignments and the final project are generally described below. Specific assignment and project instructions will be provided by the instructor during the course term.

Data and Computing Exercises (25 points each X 10 exercises = 250 points total)
Students will complete 10 data and computing assignments throughout the semester. The assignments will focus both on data concepts and skills covered in the lecture portion of the class and programming skills covered in the lab portion of the class. The data and computing assignments are designed to prepare students to complete the final project.

Final Project (100 points total)
The final project will provide an opportunity for students to apply various concepts and skills they have learned in the class. Students will be provided with datasets, and asked to work through multiple steps of the data analytics life cycle (i.e., getting data, preparing data, exploring data) culminating in the production of a 2-page policy memo presenting and discussing the data.

Grading

Grading Scale
Students can earn a total of 350 points in this course. The percentage of points earned by students will be used to calculate their course grades. The following grade scale will be used.: 94–100 = A; 90–93 = A-; 87–89 = B+; 84–86 = B; 80–83 = B-; 77–79 = C+; 74–76 = C; 70–73 = C-; Below C- = Failing

University Guidance and Policies
Please review the University's guidance and policies on select matters relating to student and classroom conduct on the course Blackboard page.

Course Schedule

Date	Class Theme	Class Topics	Class Readings	Lab Topics	Lab Readings	Due
8/29	Introduction to Data Driven Decision Making	Describing Data Driven Decision Making in the Public Policy Process	None	None	None	None
9/5	No Class – Labor Day	None	None	None	None	None
9/12	Data and Programming Basics	Data Analytics Life Cycle and Data Types	"Six Types of Data in Statistics and Research: Key in Data Science": https://www.intellspot.com/data-types "What are Data Types and Why are they Important?": https://dataled.academy/guides/data-types/	Introduction to Programming: Understanding Programming and Basic Building Blocks	Severance, Ch. 1-2 Baker. 2017. "Code Alert." "Python for Social Scientists": https://realpython.com/python-for-social-scientists/	None
9/19	Computational and Algorithmic Thinking	Computational Logic and Algorithmic Government	Engin and Treleaven. 2018. "Algorithmic Government: Automating Public Services and Supporting Civil Servants in Using Data Science Technologies." Snow. 2019. "Decision Making in the Age of the Algorithm: Three Key Principles to Help Public Sector Organizations Make the Most of AI Tools."	Conditional Execution and Functions	Severance, Ch. 3 and 4	Data and Computing Exercise 1
9/26	Different Data Forms	Big Data	Gandomi and Haider. 2015. "Beyond the Hype: Big Data Concepts, Methods, and Analytics."	Iteration	Severance, Ch. 5	Data and Computing Exercise 2

			Benoit. 2019. "Text as Data: An Overview."			
10/3	Data Quality and Biases	Assessing Data Quality and Bias	Sebastian-Coleman. 2013. "Data Quality and Measurement." Crawford. 2013. "The Hidden Biases in Big Data."	Strings	Severance, Ch. 6	Data and Computing Exercise 3
10/10	Data Measurement	Conceptualization to Measurement	"Basic Concepts of Measurement." https://www.oreilly.com/library/view/statistics-in-a/9780596510497/ch01.html	Files and Lists	Severance, Ch. 7 and 8	Data and Computing Exercise 4
10/17	Data Management	Data Management Basics	Sebastian-Coleman. 2013. "Data Management, Models, and Metadata." Strasser et al. "Primer on Data Management: What You Always Wanted to Know."	Dictionaries	Severance, Ch. 9	Data and Computing Exercise 5
10/24	Database Structure and Management	Introduction to Database Types	Torfs and Brauer. 2014. "A (Very) Short Introduction to R."	R basics and the tidyverse Packages: dplyr tidyr	https://www.tidyverse.org/packages/ https://dplyr.tidyverse.org/ https://github.com/rstudio/cheatsheets/ blob/main/data-transformation.pdf https://tidyr.tidyverse.org/	Data and Computing Exercise 6

					https://github.com/rstudio/cheatsheets/blob/main/tidyr.pdf	
10/31	Data Visualization	Best Practices in Data Visualizations	Sinar. "Data Visualization."	R Data Visualization	https://ggplot2.tidyverse.org/ https://github.com/rstudio/cheatsheets/blob/main/data-visualization-2.1.pdf	Data and Computing Exercise 7
11/7	Data Visualization	Types of Data Visualizations	Netquest. "A Comprehensive Guide to Data Visualization.":	Tableau Introduction	https://www.tableau.com/academic/students	Data and Computing Exercise 8
11/14	Data Description	Writing about Data Effectively	Kettl, 1-5	Tableau Data Visualization		Data and Computing Exercise 9
11/21	No Class – Thanksgiving Break	None	None	None	None	None
11/28	Data Communication	Communicating Data Effectively	Cairney and Kwiatkowski. 2017. "How to Communicate Effectively with Policymakers: Combine Insights from Psychology and Policy Studies." National Center for Education Statistics. 2011. "Best Practices Brief: Stakeholder Communication Tips from the States.":	None	None	Data and Computing Exercise 10
12/5	Community Engagement in Data Analytics	Stakeholder Engagement in the Data Analytics Life Cycle	Woods. 2019. "A Design Thinking Mindset for Data Science.": https://towardsdatascience.com/a-design-thinking-mindset-for-data-science-f94f1e27f90	None	None	None

			Slunge et al. 2017. “Stakeholder Interaction in Research Processes – A Guide for Researchers and Research Groups.” Pham et al. 2022. “The Role of Design Thinking in Big Data Innovations.”			
12/12	No Class – Final Project	None	None	None	None	Final Project Assignment