

# Course Syllabus

## VISUAL ANALYTICS

BUA 400

Jan-Mester 2025



*Martin J. Whitman School of Management  
Syracuse University  
Instructor: Roy Thomas*

**BUA 400 Visual Analytics**  
**M/T/W/T/F Jan 6<sup>th</sup> to 10<sup>th</sup>, 2025 – 8am to 5pm**

**Instructor:** Roy Thomas  
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## **Course Description:**

In today's world, we are all aware of the massive amounts of data that is being collected and stored in digital form, every second of every day. Being able to extract insights from this type of large heterogeneous data has become both an opportunity and a challenge of our time. In this course, you will learn how to connect to different data sources, clean-up, transform, process and analyze data, and prepare it for analytical reasoning, reporting and visualization. You will be introduced to visual design principles and best visualization practices to build compelling data visualizations that tell a story. You will learn how to analyze and visualize data using popular software platforms like R, Tableau Desktop and Power BI. The course will lead you through constructing interactive visualizations, thematic maps and dashboards, enabling you to navigate and interpret complex datasets. All this will be achieved through targeted reading, experiential learning, projects, and assignments.

## **Pre-requisite / Co-requisite:**

Pre-requisite: BUA345

Co-requisite: None

## **Credits: 3**

## **Learning Objectives:**

Upon successful completion of the course, you will be able to:

- 1) Use tools to do data cleaning and preparation on a wide range of data sets.
- 2) Critique various visualizations (good and bad) and identify design principles that make good visualizations effective.
- 3) Identify stories in datasets through visual exploration.
- 4) Create rich visualizations, thematic maps and interactive dashboards that communicate data stories.

- 5) Use popular industry software platforms (namely R, Tableau Desktop and Power BI) for data visualization and visual analytics.

## Textbooks

**Required:** NONE

### Reference Books or Links:

1. Data Visualization by Kieran Healy  
<https://socviz.co/>
2. [Fundamentals of Data Visualization by Claus Wilke](#)
3. [R Graphics Cookbook by Winston Chang](#)
4. Ggplot2: Elegant Graphics for Data Analysis by Hadley Wickham  
<https://ggplot2-book.org/index.html>
5. [Loth, Alexander. \(2019\). Visual Analytics with Tableau](#)
6. Get Started with Tableau Desktop by Tableau  
<https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm>

## Attending Lectures

You will need to attend lectures **in-person**, unless you are not well. If not well, please notify your instructor by email, and attend the lecture via Zoom, or watch the recording of the lecture, after the recording is posted (usually by the end of the day).

## Hardware and Software

**Hardware:** You are required to bring your laptop to the lecture as there will be many hands-on activities during every lecture. Phones or tablets will NOT suffice. If your laptop is not functioning or is undergoing repairs, you could get a loaner from the Whitman IT department. If you are doing this course at NYC, then you won't have that option.

**Software:** During this course, you will be asked to download and install Excel, R, RStudio and Tableau Desktop. Power BI will be accessed via Remote Desktop.

INSTRUCTIONS FOR INSTALLATIONS WILL BE GIVEN LATER.

## Course Requirements and Expectations

This course will have assigned readings, several assignments, a few in-class quizzes and a couple of projects. There will be no mid-term or final exam in this course.

## Grading / Evaluation

Your grade in the course will be based on your performance in assignments, in-class quizzes, attendance, and the three projects. The breakdown is as follows:

Project 1	20%
Project 2	20%
Project 3	20%
Assignments	20%
Quizzes	10%
Attendance	10%
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<b>Total</b>	100%

## Grading Distribution

The faculty at the Whitman School developed a uniform grading policy for the undergraduate program. The policy has three goals: (1) to ensure that grading is fair and consistent across courses, (2) to encourage students to take their coursework seriously, and (3) to ensure faculty deliver a challenging academic experience.

The Letter Grades break points for BUA400-Visual Analytics, will be as shown below.

## Grading Table

Letter Grade	Percentage Range
A	95.000 – 100.000
A-	90.000 – 94.999
B+	85.000 – 89.999
B	80.000 - 84.999
B-	75.000 - 79.999
C+	70.000 - 74.999
C	65.000 - 69.999
C-	60.000 - 64.999
D	40.000 - 59.999
F	0.000 - 39.999

### Exams (0%)

- There will be NO exams in this course.

### Assignments (20%)

- There will be 4 to 6 assignments in this course.
- You are required to complete all the assignments **individually**.
- Students can seek help from other students but should NOT exchange files/answers from other students. You can pose your questions in-person or via email to the instructor.
- ALL assignments must be completed and uploaded to BlackBoard.
- Late submissions are penalized by 25% reduction every day. For instance, a delay of up to 24 hours, will result in a 25% reduction in your score, and a delay of up to 48 hours will result in a 50% reduction in your score, and so on.

### Projects (20% each, for a total of 60%)

There will be 3 projects in this course. In each project, you will be working with a large data set and will be doing some meaningful exploration and analysis of the data, ending up with visualizations that extract insights and/or tell a story about the data. The first project will be using R, the second will be with Tableau Desktop, and the third with Power BI. Delayed submissions will be penalized by a reduction in points. For instance, a delay of up to 24 hours, will result in a 25% reduction in your score, and a delay of up to 48 hours will result in a 50% reduction in your score, and so on.

### Quizzes (10%)

You can expect a short quiz at the end of some topics. The quiz will test you on the material that you have just learned during the lecture.

### Attendance(10%)

It is expected that you will attend all your lectures **in person**. Attendance via Zoom is reserved for those who are not feeling well. Attending via Zoom requires prior permission via email from the instructor. You are allowed ZERO unexcused absences for ANY reason. Every absence will cost you 3% each.

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## BUA400 JAN-MESTER SCHEDULE

Week	Topic
Day 1	<b>Visual Analytics Introduction / Data Wrangling</b> Background on visual analytics; quick refresher on R and RStudio; intro to R Markdown; intro to data cleaning and data preparation using the dplyr package.
Day 1	<b>Data Exploration</b> Finding/dealing with missing values and outliers; generate questions about the data; seek answers by visualizing, transforming and modeling.
Day 1	<b>Visual Design Principles / Intro to ggplot</b> Chart design principles; choosing the correct visualizations based on data story to tell; what works and doesn't work with specific charts; aesthetic guidelines. Intro to ggplot. Visualizing amounts with bars in ggplot.
Day 2	<b>ggplot: Basic Plot Types</b> Introduction to ggplot; aesthetics and types of data; Individual geoms; collective geoms; visualizing distributions: histograms and density plots.
Day 2	<b>ggplot: More Plot Types</b> Visualizing proportions, associations, time series, trends and geospatial data
Day 2	<b>ggplot: Advanced Designs; Interactive Visualizations</b> Learning faceting; applying themes and styling to charts; modifying scales, axes and legends; building interactive visualizations.
Day 3	<b>Tableau: Introduction</b> Familiarizing with Tableau workspace and terminology; connecting with data; working and setting up data.
Day 3	<b>Tableau: Foundations of Chart Visualizations</b> Introduction to chart visualizations in Tableau; working with common chart styles in Tableau.
Day 4	<b>Tableau: Manipulations and Transformations</b> Sorting and grouping in Tableau; Filtering and performing calculations on data.
Day 4	<b>Tableau: Maps and Dashboards</b> When and how to create geo-spatial maps in Tableau; creating choropleth maps; building worksheets and dashboards that tell a story.
Day 5	<b>Power BI: Overview and Data Preparation</b> Introduction to Power BI interface; connect to data; shape the data with Power Query Editor.

<b>Day 5</b>	<b>Power BI: Creating Models; Performing Calculations</b> Identify fact tables and dimension tables; develop a data model; set up analytic queries; understand how to write Data Analysis Expressions (DAX) for queries and calculations.
<b>Day 5</b>	<b>Power BI: Visualize and Analyze</b> Overview of data visualization in Power BI; best practices; creating basic tables, charts, reports; creating hierarchies
<b>Day 5</b>	<b>Power BI: Creating Interactive Reports and Dashboards</b> Build interaction into reports; develop report page tooltips; build meaningful dashboards that tell data story.

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### IMPORTANT NOTICE

Although I plan to adhere to the listed schedule, I reserve the right to change it as necessary.

### ***Electronics in the classroom:***

The use of phones, tablets or laptops, **for personal use**, is prohibited during the lecture.

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**Syracuse University Policies:**

Syracuse University has a variety of other policies designed to guarantee that students live and study in a community respectful of their needs and those of fellow students.

**University Attendance Policy**

Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered. Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward degree by failure to attend. Instructors set course-specific policies for absences from scheduled class meetings in their syllabi.

It is a federal requirement that students who do not attend or cease to attend a class to be reported at the time of determination by the faculty. Faculty should use "ESPR" and "MSPR" in Orange Success to alert the Office of the Registrar and the Office of Financial Aid. A grade of NA is posted to any student for whom the Never Attended flag is raised in Orange Success. More information regarding Orange Success can be found at <http://orangesuccess.syr.edu/getting-started-2/>.

**Accessibility and Disability-Related Accommodations**

*Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process.*

*If you would like to discuss disability-accommodations or register with CDR, please visit [Center for Disability Resources](#). Please call (315) 443-4498 or email [disabilityresources@syr.edu](mailto:disabilityresources@syr.edu) for more detailed information.*

*The CDR is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact CDR as soon as possible to begin this process.*  
<https://disabilityresources.syr.edu/>

**Discrimination or Harassment**

*Federal and state law, and University policy prohibit discrimination and harassment based on sex or gender (including sexual harassment, sexual assault, domestic/dating violence, stalking, sexual exploitation, and retaliation). If a student has been harassed or assaulted, they can obtain confidential counseling support, 24-hours a day, 7 days a week, from the [Sexual and Relationship Violence Response Team](#) at the Counseling Center (315-443-8000, Barnes Center at The Arch, 150 Sims Drive, Syracuse, New York 13244). Incidents of sexual violence or harassment can be reported non-confidentially to the University's Title IX Officer (Sheila Johnson Willis, 315-443-0211, [titleix@syr.edu](mailto:titleix@syr.edu), 005 Steele Hall). Reports to law enforcement can be made to the University's Department of Public Safety (315-443-2224, 005 Sims Hall), the Syracuse Police Department (511 South State Street, Syracuse, New*



*York, 911 in case of emergency or 315-435-3016 to speak with the Abused Persons Unit), or the State Police (844-845-7269). I will seek to keep information you share with me private to the greatest extent possible, but as a professor I have mandatory reporting responsibilities to share information regarding sexual misconduct, harassment, and crimes I learn about with the University's Title IX Officer to help make our campus a safer place for all.*

### **Faith Tradition Observances**

[Syracuse University's Religious Observances Policy](#) recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their traditions. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes for regular session classes and by the submission deadline for flexibility formatted classes. Student deadlines are posted in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification.

### **Policy on Faculty Use of Student Academic Work**

Academic work completed during a semester may be used by professors for educational purposes in courses during the semester. Students' registration and continued enrollment constitute consent for this purpose. Before using students' work for educational purposes in subsequent semesters, professors will either request students' permission in writing and render the work anonymous by removing all personal identification.

### **ACADEMIC INTEGRITY and ARTIFICIAL INTELLIGENCE**

As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting [class.syr.edu](http://class.syr.edu), selecting, "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online.

Students found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or

College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

### **Open Artificial Intelligence use**

Based on the assignments in this course and our specified learning outcomes, the full use of artificial intelligence as a tool, with disclosure and citation, is permitted in this course. Students do not need to ask permission to use these tools before starting an assignment or exam, but they must explicitly and fully indicate which tools were used and describe how they were used.

### ***Use of Class Materials and Recordings***

*Original class materials (handouts, assignments, tests, etc.) and recordings of class sessions are the intellectual property of the course instructor. You may download these materials for your use in this class. However, you may not provide these materials to other parties (e.g., web sites, social media, other students) without permission. Doing so is a violation of intellectual property law and of the student code of conduct.*