Course Syllabus

VISUAL ANALYTICS

BUA 400

FALL 2023

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

BUA 400 Visual Analytics

Section 001: Mo/We 3:45pm to 5:05pm Room 301

Instructor: Roy Thomas
Office: WSM013
Phone (cell): 315.447.6011
Email: rathomas@syr.edu

Office Hours (WSM 013):

Mondays and Wednesdays: 12:30pm to 2:00pm
Tuesdays and Thursdays: 1:00pm to 3:30pm

Or at other times, by appointment

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 heterogenous 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 three popular software platforms: R, Tableau Desktop and Microsoft's 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, group 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
   https://clauswilke.com/dataviz/
3. R Graphics Cookbook by Winston Chang
   https://r-graphics.org/
4. Ggplot2: Elegant Graphics for Data Analysis by Hadley Wickham
   https://ggplot2-book.org/index.html
5. Title: Visual Analytics with Tableau
   Author: Alexander Loth
   Publisher: Wiley
   Edition: 1st Edition
   ISBN: 978111956020354000
6. Get Started with Tableau Desktop by Tableau
   https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm
7. Getting Started with Power BI by Microsoft
   https://learn.microsoft.com/en-us/power-bi/fundamentals/service-get-started
8. Power BI – The DAX Guide
   https://dax.guide/

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.

Software: During this course, you will be asked to download and install Excel, R, RStudio, Tableau Desktop and Microsoft Power BI. Other than Power BI, these packages can be installed on Macs or Windows.
Mac users will have to access Power BI through the SU Remote Desktop. Or you can run Windows on the Mac, with the help of Apple Boot Camp, or with 3rd party programs like Parallels Desktop, VMWare Fusion or VirtualBox.

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 three group 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, participation, and the three group projects. The breakdown is as follows:

Group Project 1	20%
Group Project 2	20%
Group Project 3	20%
Assignments	20%
Quizzes	10%
Attendance	6%
Analytics in the News Presentations	3%
Completing Instructor evaluation	1%

Total	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 policy is as follows: For all undergraduate courses taken at the Whitman School with 25 or more students enrolled, the mean grade shall be no higher than 3.3 and the maximum percentage of A/A- is 33%.

Multiple sections taught by the same professor will be aggregated together to calculate the mean grade and percentage of A/A- awarded. Deviations to the above policy may occur depending on individual class performance.

The Letter Grades break points for BUA400-Visual Analytics, will be as shown below. Please note that the percentage ranges for A and A- are the ONLY ranges that are NOT pre-determined. The range for A and A- will be based just on what will result in at-most 1/3 of the students getting an A and A-. The range for A will be based on what will result in HALF the A and A-

students getting an A. So, for instance, if there are 45 students in the class, their 45 scores will be sorted in descending order. As 1/3 of 45 students is 15, the 15th student's percentage score will be used to determine the break point for A-. To ensure that half of the 15 students get an A, and the other half get an A-, the 8th student's percentage score will be used to determine the break point for A.

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 not allowed, as the answers to the assignments are posted as soon as the due date has passed.

Group Project (20% each, for a total of 60%)

Business activities are almost always a group effort. Therefore, learning how to work effectively in a group is a critical part of your business education. The group size will be 4, and the membership will be determined by the instructor.

There will be 3 group 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. The instructor will use peer evaluation ratings of your group participation to make necessary adjustments to your grades. Delayed submissions will be penalized by a reduction in points. For instance, a delay of up to 24 hours, will result in a 10% reduction in your score, and a delay of up to 48 hours will result in a 20% reduction in your score, and so on.

Deadlines for Group Projects:

Group Project 1	11pm, Friday, Oct 20th, 2023
Group Project 2	11pm, Wednesday, Nov 15th, 2023
Group Project 3	11pm, Saturday, Dec 16th, 2023

Quizzes (10%)
You can expect a short quiz at the end of some lectures. The quiz will test you on the material that you have just learned during the lecture.

Attendance(6%)
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 TWO unexcused absences for ANY reason. Every additional absence, beyond these two, will cost you 1% each. Thus, if you are absent 6 or more days, beyond the allowed two absences, your attendance score will be 0%.

"Analytics in the News" Presentations (3%)
Every day in the news, it is easy to find articles that have one or more visualizations. You will select ANY news article with visualizations, from the recent past, that is of interest to you. Based on a roster that will be published at the start of the semester, you will present ONCE during the semester to the class. The presentation should NOT exceed five minutes and should be accompanied with a PowerPoint. The presentation will give a gist of the article, and then will focus on the visualization(s).

Completing Instructor Evaluation(1%)
At the end of the semester, you will be asked to complete an Instructor Evaluation by the university. When you complete it, just post a picture of the confirmation email that you get, to Blackboard, to receive this 1%.

BUA400 SEMESTER SCHEDULE

Week	Topic
Week 1: 8/28 and 8/30	**Visual Analytics Introduction / Data Wrangling** 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.
Week 2: 9/4(Labor day) and 9/6	**Data Exploration** Finding/dealing with missing values and outliers; generate questions about the data; seek answers by visualizing, transforming and modeling.
Week 3: 9/11 and 9/13	**Visual Design Principles** Chart design principles; choosing the correct visualizations based on data story to tell; what works and doesn't work with specific charts; aesthetic guidelines.
Week 4: 9/18 and 9/20	**ggplot: Introduction - Basic Plot Types** Introduction to ggplot; aesthetics and types of data; Individual geoms; collective geoms; visualizing distributions: histograms and density plots.
Week 5: 9/25 and 9/27	**ggplot: More Plot Types** Visualizing proportions, associations, time series, trends and geospatial data
Week 6: 10/2 and 10/4	**ggplot: Advanced Designs; Interactive Visualizations** Learning faceting; applying themes and styling to charts; modifying scales, axes and legends; building interactive visualizations.
Week 7: 10/9IFall Break) and 10/11	**Tableau: Introduction** Familiarizing with Tableau workspace and terminology; connecting with data; working and setting up data.
Week 8: 10/16 and 10/18	**Tableau: Foundations of Chart Visualizations** Introduction to chart visualizations in Tableau; working with common chart styles in Tableau.
Week 9: 10/23 and 10/25	**Tableau: Manipulations and Transformations** Sorting and grouping in Tableau; Filtering and performing calculations on data.
Week 10: 10/30 and 11/1	**Tableau: Maps and Dashboards** When and how to create geo-spatial maps in Tableau; creating choropleth maps; building worksheets and dashboards that tell a story.
Week 11: 11/6 and 11/8	**Power BI: Overview and Data Preparation** Introduction to Power BI interface; connect to data; shape the data with Power Query Editor.

Week 12: 11/13 and 11/15	**Power BI: Creating Models; Performing Calculations** 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.
Week 13: 11/20 and 11/22	**Thanksgiving Break**
Week 14: 11/27 and 11/29	**Power BI: Visualize and Analyze** Overview of data visualization in Power BI; best practices; creating basic tables, charts, reports; creating hierarchies
Week 15: 12/4 and 12/6	**Power BI: Creating Interactive Reports and Dashboards** Build interaction into reports; develop report page tooltips; build meaningful dashboards that tell data story.
Week 16: 12/11	**Power BI: Group Project 3 Wrap Up** Group members collaborate in class; can request direction and help on Project 3.

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.

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 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, 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 Policy

Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. You can read what students need to know here: https://class.syr.edu/academic-integrity/policy/

The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation 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 as described in the Violation and Sanction Classification Rubric. SU students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice.

The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including

course failure, regardless of violation level. **Any established violation in this course may result in course failure** regardless of violation level.

All academic integrity expectations that apply to in-person quizzes and exams also apply to online quizzes and exams. In this course, all work submitted for quizzes and exams must be yours alone. Discussing quiz or exam questions with anyone during the quiz or exam period violates academic integrity expectations for this course.

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 and present the work as your own violates academic integrity expectations in this course.

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.