

# Visual Analytics

MDIA 4132x/5132x

Spring 2022

Instructor: **Laeq Khan, PhD**

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## Overview

The visual analytics hands-on course trains students to work on interactive visual interfaces that support analytical reasoning and reveal vital actionable insights. This course introduces students to concepts, tools, and best practices in visual analytics as they examine and uncover hidden opportunities deep within big data. Interactive visual representations are integrated within underlying analytical processes, including descriptive and predictive analytics, to facilitate high-level data-driven decision-making. Based on readings, cases studies, tutorials, and analytics assignments, course emphasis is on providing a thorough understanding of visual analytics tools. Students learn to go beyond charts and graphs to create multi-dimensional exploratory views of data. The aim is to equip students to think like data analysts equipped with the knowledge and understanding of visual analytics principles, creating effective dashboards and visual analytics solutions using Tableau.

## Learning outcomes

Students fully engaging with this class and completing all the assignments successfully will, as a minimum be able to:

- Access and connect data to support high-quality analyses.
- Visually transform data to support assessment, planning, and decision-making.
- Create, analyze, and evaluate representations of dynamic data in dashboards.
- Demonstrate the recognition of patterns within data through perceptual inference of relationships.
- Identify patterns of predictive analytics in the appropriate contexts.

## Course Evaluation & Grading

To get credit for this class, students need to meet the following requirements:

Design Contest	Quizzes	Class Participation	Final Project
10%	15%	5%	70%

Details will be provided in class and on blackboard.

## Books / Materials

- Andrienko, et al.: *Visual Analytics for Data Scientists*. Springer Nature Switzerland AG 2020.
- Cairo, Alberto: *The Truthful Art*. Pearson 2016.
- Knaflic, Cole: *Storytelling with Data*. John Wiley & Sons, New Jersey, 2015.
- Foreman, J.: *Data Smart, Using Data Science to Transform Information into Insights*. John Wiley & Sons, Indiana, 2014.
- Keim, Daniel et al. (eds): *Solving problems with Visual Analytics*. Eurographics Association, Goslar, Germany, 2010.
- Milligan, J.: *Learning Tableau 2020 (4<sup>th</sup> ed)*. Packt Publishing, 2020.

*Note: Required reading materials will be provided as pdfs on the Blackboard.*

## Software for this Course:



Microsoft Excel



## Grading Scale:

- A (93-100)
- A- (90-92.9)
- B+ (87-89.9)
- B (83-86.9)
- B- (80-82.9)
- C+ (77-79.9)
- C (73-76.9)
- C- (70-72.9)
- D+ (67-69.9)
- D (63-66.9)
- D- (60-62.9)
- F (0-59.9)

## Grading

Each assignment has a score value corresponding to its percentage (e.g. 10% is a score value of 100 points), with a maximum of 1000 points for the entire course. You have access to your grading information on blackboard.

The course outcomes will be assessed through the following mechanisms:

- **Design Contest (10%)** – To give you practice with data, cognition, and design principles, you will complete a mini visual analytics project. I will provide you with real-world data and pose one or more questions—you will make engaging visualizations. This will be in groups of no more than 3 students per group.
- **Quizzes (15%)** - To enable students to grasp the content of the readings and have a thorough understanding of the course content, there will be a total of three quizzes.
- **Class participation (5%)** – since this is an online class, during a class session all students are required to participate fully by (i) having their cameras on for the whole class session (ii) be respectful (iii) present themselves professionally with good lighting and background, and (iv) being attentiveness in class and ready to answer course related questions.
- **Final project (70%)**: Through the final project, you will demonstrate your data visualization skills acquired during this course. The project will consist of a Tableau analysis, a written report, and a presentation. The semester-long visualization project split into several stages, including literature review, design, alpha release, beta release, final release, presentation, and report on Medium.com. Project details will be posted during the semester.

## Course policies

### *Attendance*

You are expected to attend each class meeting, appear on time, and stay for its whole duration. Any inevitable absences have to be justified. The class is designed in a seminar style that relies on each individual student's presence and participation. Absences affect the entire class, not just the absent student.

### *Learning Disabilities*

If you have a documented disability with the Office for Institutional Equity, it is your responsibility to meet with me some time during the first three weeks of class so that we may arrange for accommodations suited toward your need. Ohio University's Office of Institutional Equity also has resources that you may want to use. If you have not registered as a student with a

## Deadlines

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### January 28

Quiz 1

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### February 25

Quiz 2

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### March 18

Design Contest Assignment

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### March 7 - 11

Spring Break

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### April 1

Quiz 3

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### April 13 & 20

Final Presentations

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### April 22

Final Project Due

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### Some other important points:

- *I expect everyone to give this class their full attention and their full effort. And from my side, I will do everything I can to help you get the best from the class.*
- *Class participation will be measured by how well, and often, you articulate your thoughts in class, and how well you are prepared for class. Important: Poor class behavior will lower your grade substantially.*
- *Check your Ohio University email account. All class correspondence will be sent to you via this account.*

disability, you should contact the Office of Student Accessibility Services <http://www.ohio.edu/equity/disabilityservices>.

#### *Academic misconduct and classroom policies*

Academic misconduct such as cheating, plagiarism, falsification, misrepresentation, as well as any other form of prohibited conduct listed under Section D of Ohio University's Student Code of Conduct will be sanctioned as specified in that document. Grade penalties may also be applied. You can access the Code of Conduct at this site:

<https://www.ohio.edu/communitystandards/upload/Ohio-University-Student-Code-of-Conduct-effective-081915.pdf>.

#### *Late submission of assignments*

Due dates for class assignments are communicated in this syllabus and on blackboard. **All assignments are due on Friday by 11:59 pm via Blackboard.** For each partial or complete day an assignment is late, the grade will be lowered by 10%.

#### Ethics and Title IX

The School of Media Arts & Studies honors the dignity of each member of our community. Sexual misconduct has no place in our program nor in the media industry. Moreover, our faculty is committed to a diverse and safe community, and as such, acts of hate and discrimination will not be tolerated. All our students have a right to an education that is free from violence, intimidation, and sexual misbehavior. We make our commitment explicit with a zero-tolerance response policy for sexual misconduct. In order to meet our commitment to a safe and productive educational environment for all students and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, faculty members are required to report to the University's Title IX Coordinator any incidents of sexual misconduct that come to their attention.

#### Copyright

The lectures, classroom activities, and all materials associated with the class and developed by the instructor are copyrighted in the name of the instructor, Laeeq Khan, January 2022; copyright on readings is covered by the educational exclusion.

#### Your instructor



*M. Laeeq Khan (Ph.D., 2014, Michigan State University, USA) is an Associate Professor in the School of Media Arts & Studies, and*

*the founding Director of the Social Media Analytics Research Team (SMART) Lab. Professor Khan is a computational social scientist with expertise in data mining, text analytics, social network analysis, and data visualization. He is a recipient of multiple awards for his research, journalism, and teaching excellence.*



## Class Schedule

Below is an approximate schedule of classes. The syllabus is subject to change based on the needs of the class, and events during the semester. You will be kept up to date about any changes.

<i>January</i>			
12	Module 1	<b>Introduction to Visual Analytics</b> Course Logistics Historical Perspective Application & Process of Visual Analytics Building block of Visual Analytics	Student Introductions
19	Module 2	<b>Visual Analytics Overview</b> Definition, Process, Trends, Challenges Why Visual Analytics	Team Formation
26	Module 3	<b>Visualization Principles</b> Basic Principles Salient Qualities Visualization Theory Visualization Types	<i>Quiz 1</i>
<i>February</i>			
02	Module 4	<b>Perception, Cognition &amp; Interactive Visualizations</b> Data Visualization & Human Perception Psychology of Perception & Cognition The Power of Vision Pre-attentive Processing Gestalt's Principles The Golden Ratio Tufte's Principles User Evaluation & Software	Download and Install Tableau
09	Module 5	<b>Data Acquisition &amp; Sources</b> Interactive visual analytics core processes Types of Data Sources Free Data / Open Data Sources Other Data Sources by Category Data Sources in Social Media Channels	Excel Tutorial - Sample Data & Spreadsheet Activity
16	Module 6	<b>Data Wrangling</b> What are Spreadsheets? Dimensions & Metrics Analyzing Twitter data in a spreadsheet	Tableau Tutorial - Introduction to Tableau for Data Visualization
23	Module 7	<b>Representing distribution of Numeric Values</b> Choosing an Effective Visual Spreadsheets & Pivot Tables	<i>Quiz 2</i>
<i>March</i>			
02	Module 8	<b>Representing Temporal Distributions</b> Temporal Data transformation Analysis of Temporal Data	Project Proposals Due

09	Spring Break		
16	Module 9		<i>Design Contest Assignment Due</i>
23	Module 10	<b>Representing Spatial Information</b> Forms of Spatial Data Transformations of Spatial Data Visual Analytics Techniques	Tableau Tutorial - Creating Visualizations & Maps in Tableau
30	Module 11	<b>Visual Analytics for Images &amp; Video</b> Image Collections or Video Frames Analysis of Movements	<i>Quiz 3</i>

### *April*

06	Module 12	<b>The Need for Visualization in the Internet of Things</b> Understanding Data in Motion The Internet of Things The Art of Animation Human Centered Design Playful Data Visualization	
13	Module 13		<i>Project Presentations</i>
20	Module 14	<b>Final Project Due</b>	<i>Project Presentations</i>
27	Module 15	<b>Exam Week</b>	