



MASTER OF BIOTECHNOLOGY PROGRAM

*Compulsory Course Component*

BTC1878H

# HEALTH DATA VISUALISATION WITH TABLEAU

Shafquat Arefeen

Winter, 2023

# MASTER OF BIOTECHNOLOGY

## UNIVERSITY OF TORONTO MISSISSAUGA

### BTC1878H – Health Data Visualisation with Tableau

#### Course Outline (Winter 2023)

Class Location: Kaneff Centre, Room KN-112

Class Times: Wednesdays, 9:00AM-12:00PM

Instructor: **Shafquat Arefeen**

Office Location: (Discord) Username: Humiditea#5505  
Accommodation can be made for in person/zoom meetings if contacted 24 hours before Office Hours.

Office Hours: Wednesdays, 12:00-1:00PM

Contact: [s.arefeen@utoronto.ca](mailto:s.arefeen@utoronto.ca)  
<https://utoronto.zoom.us/j/4174481226>  
Meeting ID: 417 448 1226  
Passcode: 143614

#### Course Description

The objective of this course is to help you learn how to effectively communicate scientific research analysis through data visualization. It will build upon your previous experience in R in addition to using SQL and Tableau to clean, transform and visualize data. On completion of this course, you will be able to frame various classes of healthcare problems as analytics problems using Tableau to appropriately identify data sources and build visualizations off of them. You will get practice in planning and developing interactive dashboards that help answer analytical problems and provide data accessibility to a non-technical audience.

The software required for this course include R, R Studio, Tableau Prep, and Tableau Desktop.

Tableau Desktop and Tableau Prep can be installed by registering for a license at Tableau's Academic website: <https://www.tableau.com/academic/students>. You are provided with a year's free license and access to the entire eLearning suite which is a great supplemental learning resource for this course.

This will be a technical software-based course that will approach learning from a hands-on approach. There will be exercises in each class to augment the lessons taught by the instructor. These exercises will be for educational purposes and won't be graded. However, they will be extremely beneficial in preparation for assignments and exams.

Presentation is a big part of translating and sharing data analysis to a non-technical audience. As such, the midterm assignment will require you to analyse and present meaningful insights from data. The final exam will showcase your journey through this class: from cleaning and transforming real data to presenting it in a publicly visible dashboard. Students will be expected to host their dashboards on a Tableau Public

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(<https://public.tableau.com/en-us/s/>) profile. Accessibility, formatting, interactivity, and accuracy of the data will all play a factor in the final grade for this dashboard.

## Course Material

You will find all the required readings and lecture notes on Quercus. Additional readings can typically be found online (for example, [Tableau's eLearning suite](#)) or will be made available on Quercus as necessary. For the purposes of this course, Stack Overflow and Google will be very good companions.

Supplemental material can be found from the following sources:

- Milligan, Joshua N. 'Learning Tableau 2019', 3<sup>rd</sup> Edition, Packt Publishing  
<http://projanco.com/Library/Learning%20Tableau%202019%20Tools%20for%20Business%20Intelligence,%20data%20prep,%20and%20visual%20analytics.pdf>
- W3 Schools SQL tutorial <https://www.w3schools.com/sql/>

## Marking Scheme

The breakdown of the grade for the course will be as follows:

Assignment 1 .....	15%
Group Project .....	20%
Group Project Presentation .....	10%
Assignment 2 .....	15%
Final Exam .....	40%
<b>TOTAL .....</b>	<b>100%</b>

## SCHEDULE OF ACTIVITIES

Session	Topic	Assignments
1	<b>Introduction to the Course Introduction to Data Structures</b>	<ul style="list-style-type: none"> <li>○ Laying the foundation of the course and providing the roadmap</li> <li>○ Going over the course outline and discussing any questions regarding it</li> </ul>
2	<b>Data Analysis in R Intro to SQL</b>	<ul style="list-style-type: none"> <li>○ Comparing R dataframe manipulation with Microsoft Excel functions</li> <li>○ SQL Introduction</li> </ul>
3	<b>SQL and Joins</b>	<ul style="list-style-type: none"> <li>○ Working with SQL to understand how to effectively query tables</li> </ul>
4	<b>Tableau Prep Data Cleaning</b>	<ul style="list-style-type: none"> <li>○ Make sure to have registered for a Tableau license before this class and have Tableau Prep/Tableau Desktop installed on your machine</li> <li>○ Implementing previous learned data cleaning methods in Tableau Prep</li> <li>○ Looking at advantages/disadvantages of using Tableau Prep over R/Excel/SQL</li> </ul>
5	<b>Intro to Tableau Desktop</b>	<ul style="list-style-type: none"> <li>○ Navigating the GUI (Graphical User Interface)</li> </ul>
6	<b>Connections and Joins Charts/Graphs</b>	<ul style="list-style-type: none"> <li>○ Implementing different types of joins in Tableau through multiple different data connections</li> </ul>
7	<b>Group Presentations</b>	<ul style="list-style-type: none"> <li>○ Presentations for Midterm project</li> </ul>
8	<b>User Input</b>	<ul style="list-style-type: none"> <li>○ Creating user input parameters</li> <li>○ Calculating data based on user input</li> </ul>
9	<b>Actions and Interactivity</b>	<ul style="list-style-type: none"> <li>○ Connecting the dashboard together through interactive sheets</li> </ul>
10	<b>UX/UI Formatting</b>	<ul style="list-style-type: none"> <li>○ Styling dashboards to direct users' attention and highlight key elements</li> <li>○ Minimal, effective dashboard design techniques</li> </ul>
		<ul style="list-style-type: none"> <li>○ <b>Assignment 2 due</b></li> </ul>
11	<b>Geo-visualizations</b>	<ul style="list-style-type: none"> <li>○ GIS basics and data visualizations with maps</li> </ul>
12	<b>Tableau Mobile Amalgamation of the Dashboard</b>	<ul style="list-style-type: none"> <li>○ Making sure dashboards are accessible on mobile devices</li> <li>○ Recap on what we learned</li> </ul>
		<ul style="list-style-type: none"> <li>○ <b>Final Exam</b></li> </ul>

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## Conduct of Classes

Full attendance, preparation and participation are required for all in-class sessions and group work. We recognize that there may be valid reasons of illness and other major circumstances which prevent full attendance. Due to the condensed nature of the course material and hands-on nature of the sessions, any absence could seriously impact on your ability to satisfy the program requirements. We ask that you phone or email the instructor in advance and upon your return, provide the instructor with written documentation supporting the reason for your absence.

## Expectation for Online Courses

Students are expected to display tolerance and respect in all communication. Communicate with others the same way you would in a traditional classroom. Comments and language should be respectful and appropriate for a university community. All comments should also follow acceptable grammar and spelling.

Students in an online course will login as requested by the instructor. Maintaining a professional appearance and attire throughout the duration of the online classes is required.

Online students must be self-starters and have the maturity and motivation to work independently. It is recommended to use time wisely, be organized, self-directed and be willing to use new modes of communication and learning. Students in online classes must follow the timetable of the class strictly. Although it is an online class, it is still a classroom session and punctuality is a must. It is important to put in the needed time for classes, read all the required course material carefully, and actively participate in online class activities.

## Procedures & Rules

**MISSED TEST(S)/FINAL EXAM:** A student that misses a test due to illness must submit a completed University of Toronto Student Medical Certificate (available at: [http://www.utm.utoronto.ca/registrar/sites/files/registrar/public/shared/pdfs/medcert\\_web.pdf](http://www.utm.utoronto.ca/registrar/sites/files/registrar/public/shared/pdfs/medcert_web.pdf)) to the Instructor or Program Office (KN-209). Only the University of Toronto Student Medical Certificate will be accepted in support of petitions that cite illness as the reason for the request. Documentation concerning physician examinations must show that the physician was consulted on the day of the test date or immediately after, i.e. the next day. A statement from a physician that merely confirms a report of illness and/or disability made by the student is not acceptable. Documentation citing non-essential, preplanned medical procedures will not be acceptable. All documents must be originals and must be presented in person with a valid UofT student card within 72 hours of missing the test. Beyond 72 hours from the test date, further documentation of continued illness or disability will be required from a physician.

A student that misses a test due to domestic tragedy, at the discretion of the instructor, must provide acceptable documentation validating the explanation for absence. If a test is missed and the student does not provide acceptable documentation validating the explanation for absence, a grade of "0" may be assigned at the instructor's discretion.

**If a test is missed and validating documentation is accepted the students are expected to write a make-up test. Students must contact the instructor immediately by phone or email to make arrangements.**

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**LATE ASSIGNMENTS:** Assignments and code reviews are due at the dates and times as listed in the course outline. **No assignments will be accepted late and a grade of ZERO will be given for that assignment.**

**ACADEMIC MISCONDUCT:** Students should note that copying, plagiarizing, or other forms of academic misconduct will not be tolerated. Any student caught engaging in such activities will be subject to academic discipline ranging from a mark of zero on the assignment, test or examination to dismissal from the university as outlined in the School of Graduate Studies academic handbook. Any student abetting or otherwise assisting in such misconduct will also be subject to academic penalties.

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

## Communication

### LOGGING IN TO YOUR QUERCUS COURSE WEBSITE

Like many other courses, MSC2019H uses Quercus for its course website. To access the MSC2019H website, or any other Quercus-based course website, go to the UofT portal login page at: <https://q.utoronto.ca> and log in using your UTORid and password. Once you have logged in to the portal using your UTORid and password, look under the **Courses** menu item, where you'll find the link to the MSC2019H course website along with the link to all your other Quercus-based courses.

### E-MAIL COMMUNICATION WITH THE COURSE INSTRUCTOR

At times, the course instructor may decide to send out important course information by e-mail. To that end, all UofT students are required to have a valid UofT e-mail address. You are responsible for ensuring that your UofT e-mail address is set up AND properly entered in the ROSI system.

**Forwarding** your utoronto.ca e-mail to a Hotmail, Gmail, Yahoo or other type of e-mail account is not advisable. In some cases, messages from utoronto.ca addresses sent to Hotmail, Gmail or Yahoo accounts are filtered as junk mail, which means that e-mails from your course instructor may end up in your spam or junk mail folder.

You are responsible for:

1. Ensuring you have a valid UofT e-mail address, properly entered in the ROSI system
2. Checking your UofT e-mail account on a regular basis.