Why Numbers Matter
University of Toronto
Department of Statistical Sciences
STA201H1 S 2021

LEC 0101:

Instructor:	Mohammad Kaviul Anam Khan, PhD(c)
Email:	kaviul.utoronto@gmail.com
Class Day/Time:	M 2-3PM & W 1-3 PM EDT
Office hours:	MW 3-4PM EDT on Bb Collaborate

** **This is an online course. Please note that since lectures and/or evaluations will be taking place during the above lecture times, you must be available during those times. No accommodations will be made for assessments missed during these times.***

*** **As this is an online course and all assessments must be submitted through Quercus, it is the STUDENT'S responsibility to ensure they have a reliable internet connection.***

COURSE OVERVIEW

Course Description: This course teaches non-science students the importance of quantitative reasoning to many different areas. It explores a variety of applications to such diverse subjects as economics, gambling, politics, poetry, graphics, music, medicine, demographics, sports, secret codes, and more, using only basic high school level mathematics combined with logical thinking.

Content, emphasis, etc. of the course is defined by means of the lecture material — not only the posted lecture notes. It is important to attend all lectures, as there is normally no simple way to make up for missed lectures (perhaps obtain another student's notes). There will also be many lecture examples (simple) using statistical software R. Students are not expected to know R. The instructor will provide some simple codes for practice.

Learning Outcomes: By the end of this course, all students should have a basic understanding of the uses of probability and statistics in non-scientific fields and policy making.
Pre-requisites: The prerequisites are:
This course is not open to first-year students, nor to students enrolled in any science Major or Specialist program.

COURSE MATERIALS

Course Content: All lecture slides, recordings and materials will be posted on the Quercus course page for each lecture section. Furthermore, any important announcements will also be posted in Quercus. Please make sure to check it regularly so you don't miss anything.

Textbook: There are no required textbooks. All assessments will be conducted based on lecture materials. However, there are some useful books which can be used for references.

1. "Quantitative Literacy: Thinking Between the Lines, 2nd Edition, WH Freeman", *Crader, Evans, Johnson, and Noell*

2. "Struck By Lightening", *J. S. Rosenthal*

3. "Knock on the Woods", *J. S. Rosenthal*

4. "OpenIntro on Statistics", https://leanpub.com/openintro-statistics

Statistical Software: We will be using RStudio to perform some basic visualization and statistical analyses. `R` is a free software that can either be downloaded onto your personal computer or used in the cloud. If you choose to work with `R` on your personal computer, then installation will be a two step process:

1. The base `R` framework is available for download at http://cran.r-project.org/ for Windows, Mac and Linux operating systems.

2. Next, RStudio is a good integrated development environment to `R` (makes it simpler to work in `R`) and can also be downloaded for free at https://www.rstudio.com/products/rstudio/download/.

If you don't want to download the program or run into problems with installation, you may want to consider rstudio.cloud (**link**) which only requires you to login with your email and connect to our course project via the link provided. Support for downloading and learning R (and RStudio/RCloud) will be provided during lectures or through documents on Quercus. In lectures, examples with R syntax will be provided, which should be sufficient for you to learn how to execute simple statistical analyses.

COURSE COMPONENTS

Lectures: Lectures will take place live on Bb Collaborate through Quercus with recordings posted afterwards. During lectures and videos, we will cover important course materials, as well as cover a number of examples illustrating the uses of these methods. Lecture slides/videos will contain some `R` code and output to show how to perform these methods in practice. Each lecture builds on the material from previous weeks, so it is recommended that you attend lectures regularly/stay on top of the material.

Office Hours: Instructors and TAs will hold office hours through Bb Collaborate in the Quercus course page. The office hour schedule will be posted on Quercus. It is recommended that you visit office hours whenever you have a question about the material. It is more important than ever in an online class to have material clarified as quickly as possible. Don't wait until the last minute to ask your questions!

Quercus Discussion Board: We will be using the Quercus Discussion Board as an online discussion forum. **All questions about course material should be posted here** or asked during TA/instructor office hours. The instructor and TAs will monitor the board and will help answer questions but students are encouraged to answer posts and help their fellow classmates.

GRADING SCHEME

<u>All students</u> will be evaluated in the following way:

Assessment	Date Due/Occurring	Marks (%)
Online Quizzes ($\times$5)	Last 20 minutes of Wednesdays of Weeks 4, 6, 8, 10 & 12)	20%
Discussion Board Participation	Ongoing (from week 3)	5%
Term Test	March 3rd 1-3PM EDT	25%
Assignment 1	February 14 at 11:59PM EDT (End of week 5)	10%
Assignment 2	March 28 at 11:59PM EDT (End of week 10)	10%
Final Exam	TBA	30%

Please note that the last day to drop the course without penalty is March 15, 2020.

EVALUATION BREAKDOWN

Online Quizzes: There will be 5 online quizzes, each worth 4% of the overall grade; these will occur during the last 20-25 minutes of the lecture time of Wednesday's during weeks 4, 6, 8, 10 and 12. Quizzes will begin on **Wednesday, February 3rd** and continue until the last lecture period. The quizzes will be uploaded in Quercus and please make sure that you have a decent internet connection.

- The quizzes will be multiple choice and cover material from the previous set of lectures. You may wish to have a calculator/computer available at this time to aid in any calculations/computations.

- Quizzes can be found on Quercus under the "Quizzes" tab in the navigation bar, or through the link provided in that week's module, and will only be available during the designated quiz time. Quizzes must be done individually.

- **Missed quiz policy:** Students can miss up to **two (2)** quizzes without academic penalty. The student will need to provide **24-hour notice** to the instructor; i.e. if a quiz is scheduled for Wednesday at 2:30 PM EDT, the student must send an email before 2:30 PM EDT on Tuesday. Otherwise, the quiz will count and a zero will be assigned. If a quiz is missed and advance notice is given, the remaining quizzes will be evenly reweighted and will still be worth 20% of the overall grade. For example, if one quiz is missed, the remaining four quizzes will each be worth 20/4=5%; if two quizzes are missed, the remaining three quizzes will each be worth 20/3=6.67%. Once a student decides to take a quiz, the grade will be counted. No further accommodations will be made for missed quizzes. There will be no accommodation available beyond two quizzes.

Term Test: The term test on March 3rd has to be submitted online via Quercus. The term test will be based on the contents of the first six weeks. More information on this test will be provided later.

Assignments: You will be assigned two assignments in the term. The purpose of these assignments is to solidify your understanding on data analysis skills which will be useful for future statistics/mathematics courses. The assignments will have a some focus on the use of statistical software (R specifically), and will involve applying the methods learned during lecture to a dataset. Late assignments will be penalized. Late submissions will receive a 20% penalty for each day that the assignment is late. In general, extensions will not be given unless a valid reason is provided. In such cases, the instructor may decide to grant an extension of up to 5 days.

Final Exam: The details about the final exam will be provided during the last week lectures. For the final exam we will be following standard University of Toronto Schedule

MISSED ASSESSMENT POLICY
Students are responsible for completing all of the assessments detailed in the previous section. If a student is sick and needs to request an extension or accommodation on a quizzes and term tests, they must send an email to their instructor. In order for the request to be considered, the email:

- must be received at least one day before the assessment is due;

- must include the course code in the subject line;

- must include your full name and student number;

- must specify for which assignment/test/quiz the extension/accommodation is being requested;

- must include the following sentences:

    - "I affirm that I am experiencing an illness or personal emergency and I understand that to falsely claim so is an offense under the Code of Behavior on Academic Matters."

- "I understand that the weight of this assessment will be moved to the weekly quizzes (10%) and to the final exam (5%)"

In order to pass this course, students must attend the final exam.

COMMUNICATION

Please do not email the instructor with questions related to the content of the course. These types of questions are much easier to answer through the discussion board or during office hours. Emails that do not contain sensitive or personal information will be directed to post the questions on the discussion board. If you need to email the instructor for personal reasons, please use your official University of Toronto email address, include STA201H1F in the subject and also include your full name and UTORid in the body of the email (in case we need to look anything up).

INTELLECTUAL PROPERTY

Course materials provided on Quercus, such as lecture slides, assignments, tests and solutions are the intellectual property of your instructor and are for the use of students currently enrolled in this course only. **Providing course materials to any person or company outside of the course is unauthorized use**. This includes providing materials to predatory tutoring companies.

ACADEMIC INTEGRITY

The University treats cases of plagiarism and cheating very seriously. It is the students' responsibility for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters. All suspected cases of academic dishonesty will be investigated following procedures outlined in the above document. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see http://academicintegrity.utoronto.ca/). Here are a few guidelines regarding academic integrity:

- You may consult class notes/lecture slides during quizzes and tests, however sharing or discussing questions or answers with other students is an academic offence.

- Students must complete all assessments individually. Working together is not allowed.

- Paying anyone else to complete your assessments for you is academic misconduct.

- Sharing your answers/work/code with others is academic misconduct.

- Looking up solutions to test/quiz problems online or in textbooks and copying what you find is an academic offence.

- All work that you submit must be your own! You must not copy mathematical derivations, computer output and input, or written answers from anyone or anywhere else. Unacknowledged copying or unauthorized collaboration will lead to severe disciplinary action, beginning with an automatic grade of zero for all involved and escalating from there. Please read the UofT Policy on Cheating and Plagiarism, and don't plagiarize.

ACCESSIBILITY NEEDS

The University of Toronto offers academic accommodations for students with disabilities. If you require accommodations, or have any accessibility concerns about the course, the classroom, or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or http://accessibility.utoronto.ca.

CLASS SCHEDULE - TENTATIVE

This is the tentative outline for Winter 2021. Topics may be reduced or additional topics may be added by course instructor's discretion.

Lecture	Content
Week 1 (January 11 & 13)	**Introduction:** Introduction to course, Numbers and logic.
Week 2 (January 18 & 20)	**Introduction to Probability:** Some examples from SBL and Basic concepts of Probability
Week 3 (January 25 & 27)	**Probability:** Introduction to Types of Variables and Distributions
Week 4 (February 1 & 3)	**Introduction to Statistics:** Descriptive Statistics: Central Measures, variation and skewness. **(Quiz 1)**
Week 5 (February 8 & 10)	**Data Representation and Visualization:** Various Statistical Graphs and tables. Using Information from them
February 15 & 17	**Reading Week**
Week 6 (February 22 & 24)	**Introduction to Statistics:** Effect measures such as Mean difference, Risks, rates and odds **(Quiz 2)**
Week 7 (March 1 & 3)	**Introduction to Statistics:** Inferential Statistics
Week 8 (March 8 & 10)	**Sampling:** Introducing the concept of sampling. Sampling and non-sampling biases **(Quiz 3)**
March 15	Deadline to drop course without penalty
Week 9 (March 15 & 17)	**Study Design:** Clinical Trials and vaccine trial examples
Week 10 (March 22 & 24)	**Study Design:** Observational Studies revisiting Simpson's Paradox **(Quiz 4)**
Week 11 (March 29 & 31)	**Regression:** Linear Regression
Week 12 (April 5 & 7)	Review on final exam. Discussion on some publications **(Quiz 5)**
April 13-23	Final exam period