Statistical Sciences
UNIVERSITY OF TORONTO

STA 255: Statistical Theory

Fode Tounkara

Summer 2021

Course Schedule

- **Instructor:**   Dr. Fode Tounkara
- **E-mail:**   f.tounkara@utoronto.ca.
- **Lecture:**   Tuesday, Thursday; 6 PM-9 PM.
- **Location:**   online-Blackboard Collaborate (Bb Collaborate) in Quercus.
- **Office Hours:**   Wednesday 11:00-12:00 AM, Online-Blackboard Collaborate.
- **TA Office Hours:**   TBD

How and when will the course operate?

The course will be offered entirely online this summer, with weekly synchronous meetings held in Bb Collaborate. Save the monthly course schedules found on Quercus (q.utoronto.ca) to stay on top of the weekly tasks! All listed times are in local Toronto time. If you are in a different time zone, you are responsible for any time conversions. It is recommended that you schedule important dates and times into your calendar at the beginning of term with reminders to avoid missing anything!

Course Overview

Course Description

This course presents basic statistical theory, building upon materials covered in STA220, and preparing you for further study in Statistics (if accompanied by appropriate Math courses). Mathematical tools (e.g. calculus) will be used and emphasized. Topics to include: probability, discrete and continuous distributions, expectation, moment generating functions, functions of random variables, sampling distributions, estimation and test of hypothesis, the linear model (regression).

Prerequisite:

- STA220H1/STA221H1/
- ECO220Y1 (note: ECO220Y1 may be taken as a co-requisite),
- MAT133Y1(70%)/(MAT135H1,MAT136H1)/MAT137Y1/MAT157Y1

Course Contents

The course contents, emphasis, etc. are defined by means of the lecture materials - not only the texts. Table (at the bottom) shows the tentative lecture guide. Lecture slides will be uploaded every week. However, they are just rough, point-form notes, with no guarantee of completeness or accuracy. They should in no way be regarded as a substitute for attending the lectures or for doing the weekly non-credit assignments. Important announcements, problem sets, additional examples, and other course info will be posted on the course web page on Quercus. Check it regularly.

Textbook

The required texbook:

- **Modern Mathematical Statistics with Applications**, 2012, by Devore, Jay L., Berk, Ken-neth N.

- E-book is available through the University of Toronto libraries website **Here**

Recommanded textbook: (Useful but not required)

- **Mathematical Statistics with Applications, 7th Edition**, 2008, by Wackerly D. , Mendenhall William, Scheaffer Richard L.

Your responsibilities

The course is designed to actively engage you in the course material. We hope you'll find the subject of statistics interesting, challenging, and fun, and an excellent opportunity to truly learn the material. Each week, you will be introduced to the course material through video lectures, with fine-tuning and learning support in your synchronous meetings in the following week. In order for the in-class sessions to be effective, preparing by learning about the week's concepts through the video lectures and notes is essential. Make use of the posted weekly schedules and the suggested study routine on Quercus, see the course outline.

Computing

Calculators

You will need a calculator. A scientific calculator is recommended for ease of use, but any calculator that can perform basic operations, and take powers and logarithms is sufficient.

Software

The course includes a lot of numerical calculation. We will use **Statistical programming language and environment R** software to support the class. **Using R and understanding of R outputs are required**, on the level explained in the class.

R is freely available for download at

- **https://www.r-project.org**

Rstudio is a good integrated development environment to **R**. It is strongly recommended that you also download R Studio to accompany R for a nicer user interface. It is also freely available at:

- **https://www.rstudio.com**

If you'd prefer to use a browser version of RStudio, please use the U of T JupyterHub (**https://jupyter.utoronto.ca/hub/login** with RStudio selected). You can access this platform with your U of T credentials.

Please find below a good online reference to get started with R.

- **Get started with R**

For your assignments and final project, it is recommended to use **Rmarkdown** to write your solution. R Markdown is a file format for making dynamic documents with R. Please find below a cheat sheet that may help to get started with R Markdown.

- **R Markdown**

Discussion Forum

We will be using Piazza for discussions surrounding course content. This will be a space for you to post your questions (general, textbook, practice), your answers (what you tried, where you are getting stuck), or suggestions to your peers. Piazza will be monitored regularly by instructors and teaching assistants. You can join Piazza for our course **HERE**. Be sure to familiarize yourself with their **privacy policy** before opting in to use!

Additional Help

Need extra help with the coursework? Here are some options:

- Post your question on the class discussion forum on Piazza. The instructor and TAs will monitor this discussion forum regularly.

- The instructor and TAs will have weekly office hours on Bb Collaborate.

- E-mail should only be used for emergencies or personal matters. If you email course questions to the instructor or TA, you will be asked to post your question on the discussion forum. Individual questions about the course content will not be answered via email.

Evaluation

- Quizzes (best 4 of 5× 5 %) worth 20%
- Assignments (2 × 7.5 %) worth 15%
- Midterm worth 25 %
- Final Assessment worth 40 %

Assessment	Weight	Due date	Time	Location
Weekly Quiz (best 4 of 5)	4× 5 % each	Tuesday	8:40 PM-9:00 PM	Crowdmark
Assignment 1	7.5 %	July 18	11:59 pm	Submit (on Crowdmark)
Midterm	25 %	July 29	7:30-9:00 PM	Crowdmark
Assignment 2	7.5 %	August 8	11:59 pm	Submit (on Crowdmark)
Final Assessment	40 %	Between August 18-30	TBA	Scheduled by FAS

Quizzes

You will be given 5 equally-weighted quizzes starting from week 2. These quizzes should be completed during the Tuesday class time.

- The quizzes will be held on Crowdmark and are always due on Tuesday at 9:00 PM Toronto time. Please see the course schedule for specific due dates.

    - **Quiz 1:** will cover Week-1 materials
    - **Quiz 2:** will cover Week-2 materials
    - **Quiz 3:** will cover Week-3 materials
    - **Quiz 4:** will cover Week-4 materials
    - **Quiz 5:** will cover Week-5 materials

- **15-minutes short-answer questions**

- Every Tuesday from 8:40 to 8:55 PM (starting from week 2),

- The weekly quiz will be written online (Crowdmark),

- Student will have 5 minutes to submit their answers on Crowdmark,

- The quiz will consist of short-answer questions,

- Late submission will not be allowed beyond the due date (9:00 PM),

- Email submission will not be accepted.

- **There will be no accommodations or extension granted under any circumstances**

Assignments

- There will be two equally-weighted assignments, each assignment will consist of an individual component to be completed and submitted on your own.

    - A1 : Sunday, July 18th, due 23:59

- A2 : Sunday, August 8th, due 23:59

- The assignments will each be of a practical nature, for which the use of R might be required

- Must be written as PDF files using R Markdown (word or Latex) and submitted online into **Crowdmark** by 11:59 PM on the due dates

- **Late submissions will be accepted but subject to a 5% penalty per day late**

- **Late submissions will not be allowed beyond 48 hours of the due date**

- Email submission will not be accepted.

- **There will be no accommodations granted under any circumstances**

Term Test

- 80-minutes short-questions test

- Thursday, July 29th, from 7:30-8:50 PM

- The term test will be written online (Crowdmark).

- 10 minutes to submit your answers on Crowdmark

- The information on coverage will be posted on Quercus in advance.

Final assessment

. There will **3-hours short-answer questions** final assessment

- Scheduled by the faculty

- The final assessment will be written online (Crowdmark).

- The final assessment is cumulative

- More information on coverage and the availability period will be posted on Quercus.

Missed assessments

- **There will be no accommodations made for the weekly quizzes beyond a best 4 of 5.** There are no make-up quizzes.

- **Due to the nature of the assignments, there will be no accommodations made for the assignments**. There are no make-up assignments.

- If a midterm is missed for a valid medical reason, you must fill out the absence declaration form on ACORN and inform your instructor within **three days following the term-test**. Requests after this deadline will not be accepted.

- If you miss the term-test without valid documentation, then a grade of zero will be assigned for the test.

- **An alternative assessment will be arranged at the instructor's discretion** if accommodation is granted for a missed term test. Note that this alternative assessment may have a different format (e.g., oral assessment) and may be scheduled in August after classes end.

- Other reasons for missing a test will require prior approval by your instructor. If prior approval is not received for non-medical reasons then you will receive a grade of zero for the missed midterm test.

Minimum Passing Requirement:

Students must complete and submit at minimum:

- At least 2 of the weekly quizzes
- At least one Assignment
- The term test
- The final assessment

If you miss more than these minimum passing requirements, even with accommodation, you will not be able to pass this course. There are no make-up quizzes. If there are extenuating circumstances that will affect your performance in the course in the long term, you will be responsible for contacting and informing your instructor as early as possible.

Re-grading Policy

Any requests to have marked work re-evaluated must be made in writing within **3 days** of the date the work was returned to the class. The request must contain a justification for consideration. Be sure to include your official name, student number and/or paper number for identification purposes.

Course Policies

- **Online board participation:** Questions about course material should be posted on the discussion forums on Piazza. Review discussion postings before posting your own to avoid redundancy.

- **To communication with your instructor:** Questions on online board discussion can be posted anonymously (so that the author is anonymous to other students but not to the instructors), if desired. If your communication is private, such as, "I missed the test because I was ill", then e-mail your instructor. Use your utoronto.ca e-mail account to ensure that your message doesn't automatically go to a Junk folder and include your full name, student number, and course code (STA255).

- **Deadlines for assignment submissions**
  - Late submissions will not be allowed beyond the due date
  - Email submission will not be accepted.

Institutional Policies and Support

Academic integrity

You are responsible for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters **Here**. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact your instructor.

Accessibility needs

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or http://accessibility.utoronto.ca.

Course outline

This lecture outline is tentative and subject to change as the semester progresses.

	Dates	Readings	Important Reminders
Week 1	July 5-9	Ch2: Probability, Introduction to R Ch3: Discrete RV and Probability Distribution,	July 5, class starts
Week 2	July 12-16	Ch3 continued, Ch4: Continuous R.V. and, Probability Distribution.	**Quiz 1 on July 13 at 8:40 PM-9:00 PM** **A1 due on July 18 at 11:59 PM**
Week 3	July 19-23	Ch5: Joint Probability Distribution, Ch6: Statistics and Sampling Distribution.	**Quiz 2 on July 20 at 8:40 PM-9:00 PM**
Week 4	July 26-30	Ch7: Point Estimation, Ch 8: Interval Estimation.	**Midterm on July 29 at 7:30 PM** **Quiz 3 on July 27 at 8:40 PM-9:00 PM**
Week 5	August 2-6	Ch9: Test of Hypothesis, Ch10: Inference based on two samples.	June 1-Last day to drop **Quiz 4 on August 3 at 8:40 PM-9:00 PM** **A2 due on August 8 at 11:59 PM**
Week 6	August 9-13	Ch12: Regression and Correlation, Review.	**Quiz 5 on August 10 at 8:40 PM-9:00 PM**
Week 7	August 16-20	August 18-30 – Final assessment period	August 16-Classes end August 17-Study day **Final Assessment scheduled by FAS**