STA130: Introduction to Statistical Reasoning and Data Science

Delivery: Fully online   **Online class times:**   L0101 10:10 a.m. ET (Monday)
Course email: sta130@utoronto.ca   L0201   2:10 p.m. ET (Monday)
Course webpage: All materials will be posted on Quercus (https://q.utoronto.ca)

Teaching Team Information (both instructors will teach both sections)

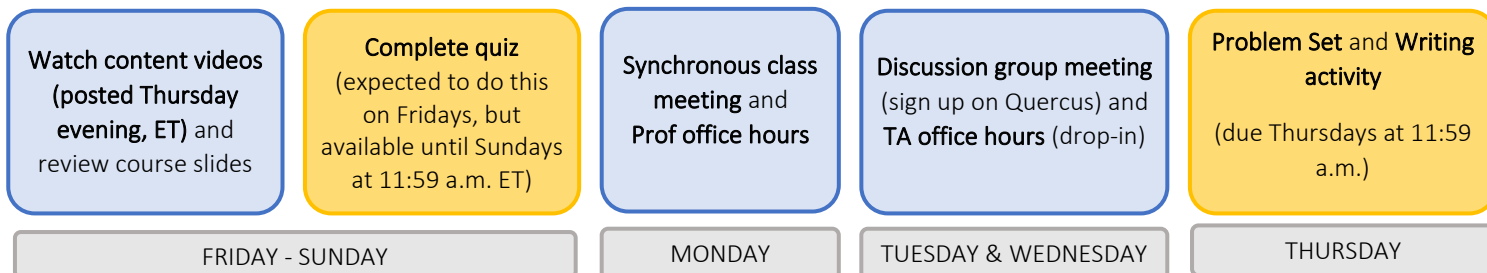|		**Office Hours**
	Professor: Samantha-Jo Caetano **Please call me:** Professor Caetano (pronouns: she/her) **How do you pronounce that?** Like "K-eye", the English word "tan", and the letter "O"	11:10 a.m.–noon 3:10 p.m.–4:00 p.m. *Note: the above times are immediately after class on Mondays, through the same link as the class meeting.*
	Professor: Nathalie Moon **Please call me:** Professor Moon (pronouns: she/her) **How do you pronounce that?** Like the English word!	Additional hours TBA
	Head Teaching Assistant: Becca Christensen **Teaching Assistant Team:** 24 experienced grads/undergrads whose job it is to support your learning in STA130!	(See Quercus)

Course Information

Statistics is about how we can learn from data. Data Science is a relatively new interdisciplinary field that also includes the computational aspects of acquiring, managing, and analysing data. Both reasoning with and computing with data play important roles in these related disciplines. The purpose of this course is to give you a broad introduction to many of the ways we can learn from data, focussing on statistical reasoning, computation and communication. We will use the R programming language and environment for statistical computing and you will gain experience communicating statistical ideas and knowledge.

Course Format and Organization

This term, we'll be trying out a flipped format for STA130. Each week, you'll watch videos, read course slides, and complete a quiz ahead of our Monday class meeting. We can then focus on applying new concepts through hands-on examples in our time together on Mondays. We hope you will join these sessions live so that you can participate, but we will record and post the sessions on Quercus for revision and to support members of the class in difficult time zones. You'll then have further opportunities to reinforce concepts and work through examples through weekly problem sets, due Thursdays at 11:59 a.m. ET. In addition to these weekly activities, there will be midterm and final assessments, three graded discussion boards and a final project.

Watch content videos (posted Thursday evening, ET) and review course slides	Complete quiz (expected to do this on Fridays, but available until Sundays at 11:59 a.m. ET)	Synchronous class meeting and Prof office hours	Discussion group meeting (sign up on Quercus) and TA office hours (drop-in)	Problem Set and Writing activity (due Thursdays at 11:59 a.m.)
FRIDAY - SUNDAY		MONDAY	TUESDAY & WEDNESDAY	THURSDAY

Learning Objectives and Assessment

By the end of the course, you should be able to:

Describe how statistical methods can be used to learn from data, including methods for description, explanation, and prediction.

Carry out a variety of statistical analyses in R and interpret the results of the analyses.

Implement the computational steps involved in the management and statistical analysis of data using R.

Identify appropriate uses of statistical methods to answer questions, including their strengths and weaknesses.

Clearly communicate the results of statistical analyses to technical and non-technical audiences.

How will your success be measured?

WEIGHT	WHAT	DATES
10%	Weekly quizzes (Best 7 of 10)	Due Sundays at 11:59am ET (midday, Toronto time) *Exceptions: No quizzes due on Sunday February 14th (beginning of reading week), Sunday February 28th (midterm week) & Sunday April 11th (after the last class meeting)*
14%	Weekly problem sets (Best 7 of 10)	Due Thursdays at 11:59 a.m. ET *Exceptions: No problem sets due on Thursday February 18th (reading week) & Thursday March 4th (midterm week)*
9%	Graded Discussion Board Activities	Weeks 3, 8 and 10; details TBA (there will also be ungraded introduction discussion in Weeks 1 & 2)
16%	Midterm assessment	Available on Wednesday March 3, 2021 from 12 am ET to 11:59pm ET
16%	Final assessment	During the final assessment period (April 13–23); details TBA
30%	Final project	Multiple due dates; details TBA
2%	Pre/post Course Surveys	Pre-course survey: Available during weeks 1–3 (January 11 – 31) Post-course survey: Available in the last week of classes (April 5 - 9)
3%	Mentorship Program	There will be events throughout the term, but final reflections are only due at the end of the term. Reflections due by Friday April 9th at 11:59am ET (midday)

Quizzes (due Sundays at 11:59 a.m. ET)

There will be a weekly quiz each week apart from reading week (between Weeks 5 and 6), the week of the midterm assessment (Week 7), and the last week of the semester (Week 12), for a total of 10 quizzes. Quizzes will consist of a combination of multiple choice, short answer, and written questions. Each quiz will cover material presented in that week's module (videos, slides, etc.). Each quiz will be available on Quercus from the time a module is posted (Thursdays at 6:00 p.m. ET) and due Sundays at 11:59am ET. *You have two hours in your timetable on Fridays (the official "tutorial" time, which we won't be using) to watch the videos, review the slides, and although we expect that completing the quiz before the weekend is reasonable, you have until Sunday to complete it if that works better for your schedule.* No late submissions will be accepted after the deadline on Sundays. Your quiz answers will automatically be submitted after 1 hour or at the due time, whichever comes first; once your quiz is submitted you cannot change your answers. You have one attempt for each quiz.

Only your top 7 of 10 quizzes will count towards your final quiz score. Because of this, no declaration of illness is required to be excused from a missed quiz, as this calculation will be applied by the instructors at the end of the term, when the course grades are downloaded from Quercus to calculate your final scores. No further accommodations for missed quizzes will be given, beyond this adjustment, so you are encouraged to attempt all quizzes rather than skip them, in case circumstances later in the term make it difficult for you to complete problem sets at that point.

Note: The last day you can add the course is Sunday January 24th, 2021. If you add the course on this date, you will have missed Quizzes 2 and 3, but will still be able to submit Quiz 1 until Sunday January 31st (this quiz will cover administrative information about the course and basic R covered in the week 1 module); you will be responsible for catching up on the other modules, but won't be able to submit the corresponding quizzes.

Problem Sets (due Thursdays at 11:59 a.m. ET)

A problem set will be assigned each week apart from reading week (between Weeks 5 and 6), the week of the midterm assessment (Week 7), and the last week of the term (Week 12), for a total of 10 problem sets. Each problem set will consist of two parts:

- Part 1: You'll be asked to complete a set of questions using R to generate figures, tables, and / or statistical analyses and interpret the results you obtain.
- Part 2: You'll be asked to write a short piece communicating statistical ideas to a non-technical audience, using the vocabulary introduced in the course. In some weeks, you may be asked to record and submit a brief audio presentation (video optional) communicating statistical ideas to a non-technical audience, instead of doing a written submission.

Problem sets will be due on Quercus by 11:59 a.m. ET (Toronto time) on Thursdays (.Rmd and .pdf files). Submissions will only be accepted through the Quercus dropbox (no email submissions), and no late submissions will be accepted. You can submit a problem set on Quercus as many times as you like before the deadline, but only the latest submission will be graded.

Only your top 7 of 10 problem sets will count towards your final problem set score. Because of this, no declaration of illness is required to be excused from a missed problem set, as this calculation will be applied by the instructors at the end of the term, when the course grades are downloaded from Quercus to calculate your final scores. No further accommodations for missed problem sets will be given, beyond this adjustment, so you are encouraged to submit problem sets (even if they are incomplete) in case circumstances later in the term make it difficult for you to complete problem sets at that point.

<u>Note:</u> The last day you can add the course is Sunday January 24ᵗʰ, 2021. If you add the course on this date, you will have missed problem sets 1 and 2. You will be responsible for submitting problem set 3 by Thursday January 28ᵗʰ at 11:59am ET and for catching up with missed material from previous problem sets (solutions will be posted on Quercus with the following week's module).

Missed Work Policies

Weekly quizzes

Your final quiz score will be calculated based on the best 7 of 10 weekly quizzes. Because of this, no declaration of illness is required to be excused from a missed quiz, as this calculation will be applied by the instructors at the end of the term, when the course grades are downloaded from Quercus to calculate your final scores. No further accommodations for missed quizzes will be given, beyond this adjustment, so you are encouraged to attempt all quizzes in case circumstances later in the term make it difficult for you to complete quizzes at that point.

Problem Sets

Your final problem set score will be calculated based on the best 7 of 10 weekly problem sets. Because of this, no declaration of illness is required to be excused from a missed problem set, as this calculation will be applied by the instructors at the end of the term, when the course grades are downloaded from Quercus to calculate your final scores. No further accommodations for missed problem sets will be given, beyond this adjustment, so you are encouraged to submit problem sets (even if they are incomplete) in case circumstances later in the term make it difficult for you to complete problem sets at that point.

Discussion boards

Extensions will not be granted for discussion boards. If a discussion board is missed for valid reasons an alternative assessment will be assigned.

To request the alternative assessment, you must send an email to sta130@utoronto.ca. For consideration, your email:

- must be received within **1 week** of the missed assessment,
- must include your full name and student number,
- must specify the assessment missed including the date, and
- must include the following two sentences:
    1. "I affirm that I am experiencing an illness or personal emergency and I understand that to falsely claim so is an offence under the Code of Behaviour on Academic Matters."
    2. "I understand that I will need to complete an alternative assessment to gain this grade and that I will be given further instructions in response to this email (if approved)."

Midterm and final assessments

If the **midterm or final assessment** is missed for a valid reason, you may ask for an accommodation. If approved, you will be offered an alternate assessment (which may be an oral exam).

To request accommodation for one of these assessments, you must send an email to sta130@utoronto.ca. For consideration, your email:

- must be received within 1 week of the missed assessment (the earlier the better),
- must include your full name and student number,

- must specify the assessment missed including the date, and
- must include the following two sentences:
    1. "I affirm that I am experiencing an illness or personal emergency and I understand that to falsely claim so is an offence under the Code of Behaviour on Academic Matters."
    2. "I understand that I will need to complete an alternative assessment to gain this grade and that I will be given further instructions in response to this email (if approved)."

Final project

Extensions for valid reasons may be granted for a maximum of 5 days. The exact extension granted will be at the discretion of the instructors.

To be considered, an extension request MUST be sent sta130@utoronto.ca by 11:59 a.m. ET (midday in Toronto) on the business day prior to the due date. Note: For Saturday, Sunday, and Monday deadlines, this will be 11:59 a.m. ET (midday in Toronto) the previous Friday.

Where possible, alert us to potential issues as early as you can. This will allow us to work together with you to find a suitable solution.

Important notes

1. If too much coursework is missed, even for valid reasons, an oral exam may be required to calculate a fair mark, at the discretion of the instructors. Please ensure you and/or your registrar get in touch with us as early as possible if this may be the case for you.
2. If you have accommodation letters from an accessibility advisor, make sure your read the instructions in the Accessibility section below.

Marking Concerns

Any request to have an assessment remarked must be emailed *to sta130@utoronto.ca (not to your TA)* within one week of the grades being posted; your request will be reviewed by the course instructors and head teaching assistant. Your request must include:

- your name and student number,
- a **detailed written justification** referring to your answer and the relevant course material to be considered; it is **not enough** to simply say that you believe your answer deserves higher credit, rather you must **support your request** with specific reference to relevant course materials.
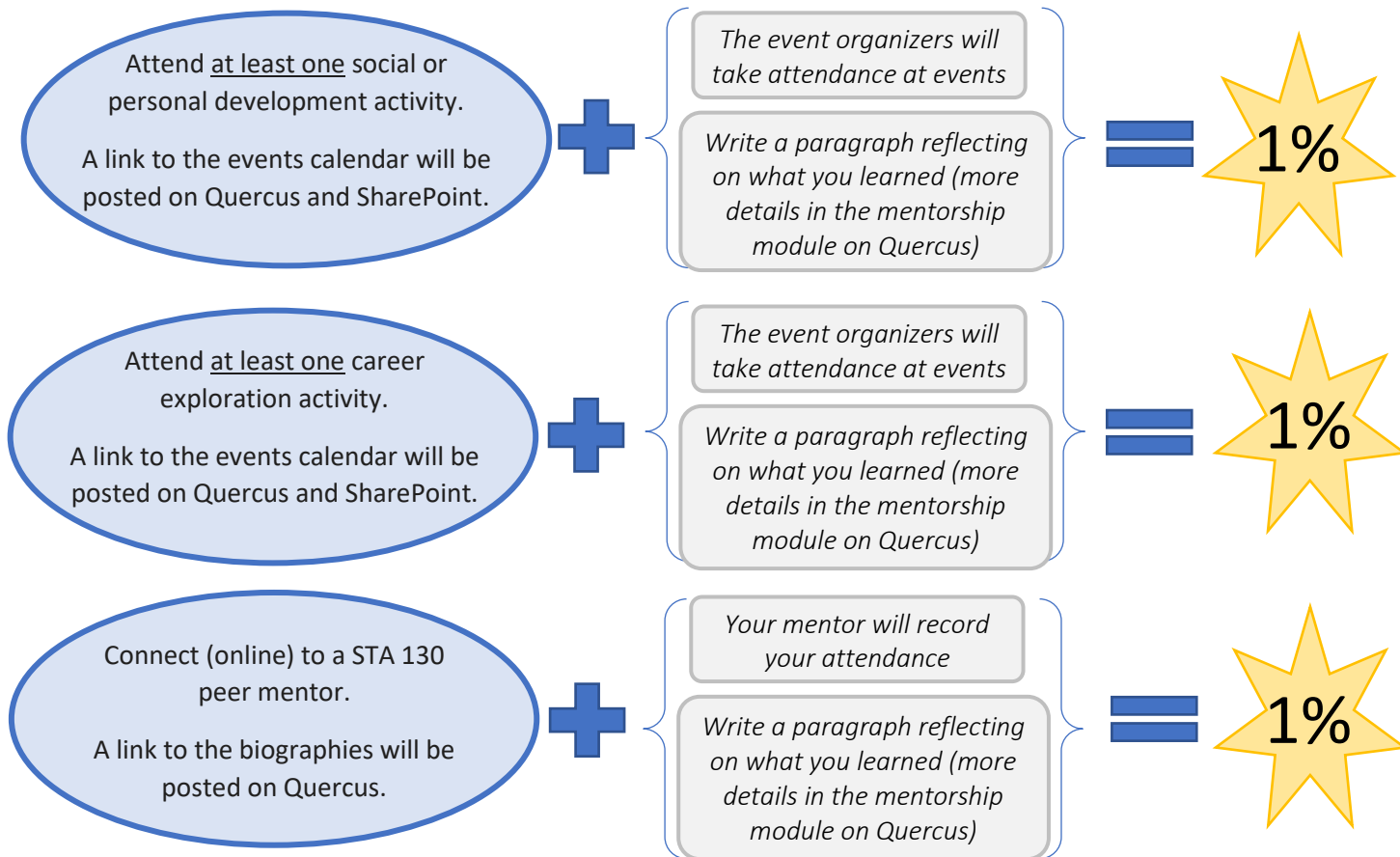
Please note that we reserve the right to review the grading of all questions or parts when you re-submit an assessment for reconsideration (i.e., your grade could go down).

Mentorship program

Finding community and support on campus not only increases your chances of academic success, but fuels your mental well-being and makes university life more fun, even online.

This program provides the foundation for success as you move through your time at UofT by exposing you to **three pillars of learning & support; (1) social/personal development, (2) career exploration, and (3) peer-to-peer 1:1 mentorship** from upper year students who know what you're going through; it's also worth 3% of your mark (1% for each of the three pillars).

What do I need to do to get credit?

Attend <u>at least one</u> social or personal development activity.

A link to the events calendar will be posted on Quercus and SharePoint.

+

The event organizers will take attendance at events

Write a paragraph reflecting on what you learned (more details in the mentorship module on Quercus)

= 1%

Attend <u>at least one</u> career exploration activity.

A link to the events calendar will be posted on Quercus and SharePoint.

+

The event organizers will take attendance at events

Write a paragraph reflecting on what you learned (more details in the mentorship module on Quercus)

= 1%

Connect (online) to a STA 130 peer mentor.

A link to the biographies will be posted on Quercus.

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Your mentor will record your attendance

Write a paragraph reflecting on what you learned (more details in the mentorship module on Quercus)

= 1%

Grading will be on-going, **please allow up to 2 weeks from date of activity to the grade appearing in Quercus.**

Note: You will only get credit for attending one event/meeting from each of the three categories (social/personal, career exploration, and peer 1:1 mentorship). While you are encouraged to attend more than one event/meeting per category, you only need to submit a reflection for your first event/meeting from each category.

For questions about the program, please contact sta130@utoronto.ca and include "Mentorship program" in the subject line.

Course Tools

Below, you'll find a list of some of the terms you will encounter in this course and more broadly at the University. You can find a more complete glossary at here. You might find the University of Toronto Student Union Handbook (https://utsuhandbook.ca/) helpful also; note that this is not an official U of T resource, but is produced by the University of Toronto Student Union.

Quercus	The online teaching and learning system where you will find your course homepages (including course materials, syllabi, announcements, and grades) and other resources. For STA130, you'll go to the course page on Quercus to access the following: - Course materials (videos, slides, class recordings, syllabus, office hour schedule, etc.) - Graded discussion forums - Links through which you can submit problem sets, projects, etc. - Important announcements about the course
Piazza	Piazza is a free Q&A platform which is used in many courses. In this course, you'll use Piazza to post questions about course content or logistics (see "Getting your questions answered" for more guidance on how to join and use Piazza). There is a tab on Quercus or this direct link. For STA130, all questions about course logistics and content should be posted on Piazza (see "Getting your questions answered" section for clarification).
utoronto email address	We will sometimes send important emails to your utoronto email account. It is important that you check this account regularly to ensure you don't miss important information. *Make sure you use this email when setting up Zoom to join classes.*
R / RStudio / Jupyterhub	Free software for statistical computing. In this course, you'll learn to use R to produce visualizations, manipulate data, and conduct analyses. Jupyterhub allows you to work with this software without having to download anything to your computer. This is where we will provide you with the tasks and data you will need to complete you weekly problem sets. *No prior programming experience is assumed.* Technically, **RStudio** is an integrated development environment (IDE) for **R**, and Jupyterhub is a University of Toronto server that allows students and faculty to access RStudio online. In this course we will probably refer to R, RStudio or Jupyterhub interchangeably. For STA130, you'll need to sign into Jupyterhub using your UofT credentials (utorid and password) and using a link provided to you by the instructors (on Quercus) to access and complete weekly problem sets. See the instructions on Quercus.
Zoom	Zoom is a video conferencing tool. You will need to set it up with your utoronto email address. See the instructions on Quercus.

Minimal technical requirements

All students should consult the minimum technical requirements for participation in online learning. If you are facing financial barriers to obtaining the required technology, please contact your College Registrar's Office to obtain information regarding your potential eligibility for a need-based bursary. If you anticipate having difficulty connecting to University websites (e.g., Quercus), please submit your question here: https://www.utoronto.ca/covid19-contact.

Getting your questions answered

Question(s) about course logistics? e.g.
- *What is the deadline for the weekly quiz?*
- *Where do I submit this week's problem set?*

Question(s) about course content e.g.
- *I don't understand the difference between mean and median?*
- *Why do we sometimes use group_by() with the summarize() function?*
- *My code won't run for question #1 in the problem set (please include screenshots of your code and the error message!)*

Information / resource to share with classmates e.g.
- *I have a link/resource/opportunity to share with my classmates*

Question(s) related to your personal circumstances (i.e. something which is not appropriate to share with the whole class) e.g.
- *I would like to request an alternative assessment for the Week 3 discussion board activity because I was ill (make sure to include all information listed in the "Missed Work" section)*
- *I would like question 2 on the midterm assessment to be regraded (be sure to include clear justification, as outlined in the "Marking Concerns" section)*

Questions about the mentorship program e.g.
- *Is this event/activity eligible for the mentorship program? (with details about the event/activity you are wondering about)*
- *Can you explain why I didn't get credit for one of my mentorship program reflections?*

Piazza forum
See link in the course navigation menu on left-hand side of Quercus.
Posts can be anonymous for your classmates, but instructors and TAs will be able to see your name.

Before posting a question, search to see if someone else has already asked a similar question (you can edit the question to add yours or post a follow-up at the bottom).

Try to answer your classmates' questions - this is a great way to reinforce your own understanding while also helping your classmates! *Don't worry if you aren't 100% sure of the answer – all answers will be reviewed / endorsed / completed by TAs and instructors!*

Course contact email: sta130@utoronto.ca
(only send emails from your utoronto.ca email address to ensure it doesn't automatically go to a Junk folder and be sure to include your full name and student number)

This account will be monitored by the head TA and course instructors; if you want to reach a specific instructor or TA, *please include their name in the subject line; do no email them directly.*

Allow 24 hours for a response during the week (Monday to Friday, ET) and do not expect responses on the weekend.

If you cannot meet a deadline because you are ill, please refer to the "Missed Work" section in this syllabus and submit all required information, if applicable, to this email account.

Questions about course content won't be answered here, but rather redirected to Piazza or office hours.

How to succeed in this course

The course is designed to actively engage you in the course material. We hope you'll find the statistical reasoning and data science interesting, challenging, and fun! In order for you to get the most from the classroom sessions:

- Always watch/read the weekly content before Monday's class meeting (there will be a quiz to help you check your knowledge),
- Complete the problem sets,
- Keep up-to-date in the course–do not leave working on grouped discussions or your project to the last minute, and
- **Ask questions!** Post in/watch the course discussion forum on Piazza and attend instructor and/or TA office hours (TA Office hours will be posted on Quercus).

Recognized Study Groups

Recognized Study Groups (RSGs) are small study groups of 3 to 6 students from the same course who meet weekly to learn course content in a collaborative environment.

Each group is made up of students from the same course. One student volunteers to be the RSG Leader and helps organize and plan weekly activities. The RSG Leader is a student who is trained in group facilitation and effective learning techniques. RSG Leaders are not tutors – they are learning along with group members.

A student staff member is also assigned to each group to help connect you to academic resources and support your group's goals.

While not compulsory for this course, we would highly recommend you get involved with an RSG. Consider inviting members of your tutorial group, also!

Meet to complete

Meet to Complete is an online "study with me" space where you can study alongside other students. Each Meet to Complete is hosted by a student to welcome you and provide support & encouragement, if needed.

To join Meet to Complete, enroll in the Meet to Complete course on Quercus! Online learning doesn't need to be lonely.

Note: Be careful about private tutoring companies

You may have been contacted by private tutoring companies trying to sell their services to you for statistics courses. Please be *extremely* careful with these services as some forms of tutoring can pose an academic offence risk. A good tutor helps you understand the subject area and supports your learning.

A good tutor does *not* give you answers. **There are no shortcuts to learning. Learning takes time and effort.**

Be cautious giving money to companies whose motivation is profit. They may tell you they have insider information. They don't. They may even offer you the opportunity to commit academic offences. Please

do not put your University of Toronto education at risk by participating in these kinds of unacceptable behaviours. If you have any questions or concerns about what is okay and what is not in your course, please ask us.

Remember, your teaching team (course instructors and TAs) know our course best and are here to help you! Please reach out to ask for course help and advice on how to learn the material.

Accessibility

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

If you have an accommodation letter from your accessibility advisor that is relevant to this course, please do the following:

- *Email your letter to sta130@utoronto.ca with "Accommodation letter" as part of the email subject, CC your advisor and let us know anything else you wish us to know/any questions you have. Please do this as soon as possible after you enrol in the course/receive this syllabus.*
- *Confirm any accommodations for **each** specific assessment **1 week** before the assessment. (I.e. if you receive extra time for timed assessments, confirm this one week prior to the midterm assessment and final assessment, even if we have already discussed this at the beginning of the semester.)*

Religious Accommodation

At the University of Toronto, we are part of a diverse community of students, staff and faculty from a wide range of cultural and religious traditions. For this course, we have sought to avoid scheduling compulsory activities in ways that will clash with religious holy days (not captured by statutory holidays). Further to University Policy, if you anticipate missing a course activity due to a religious observance, please let us know as early in the course as possible. With sufficient notice—at least three weeks—we can work together to make alternate arrangements.

Academic Integrity

You are responsible for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters.

As a general rule, we encourage you to discuss course material with each other and ask others for advice. However**, it is not permitted to share answers or to directly share R code or written answers for anything that is to be handed in (e.g., weekly problems and assessment)**. For example, "For question 2.1 what R function did you use?" is a fair question when discussing course material with others in the class; "Please show me your R code for question 2.1" is not an appropriate question. If writing or code is discovered to match another student's submission or outside source, this will be reported as an academic offence. When asked to hand in code and a problem set or project document, the code you submit must have been used to generate the document. If it does not (i.e., the submitted code does not match the submitted output), this is also considered an academic offense. Academic

offenses will be taken very seriously and dealt with accordingly. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact your instructor.

Note that when an assignment is to be completed as a team (e.g., project), you may discuss and share answers and code with other members of your team, but not with another team in the class or anyone outside the course.

Plagiarism

You may be at risk of plagiarising if you do not understand the rules and your responsibilities. You must not present the work of others as your own. This includes, but is certainly not limited to, copying text and including it in your writing without a citation and quotation marks.

There are many resources to help you learn more:

- https://guides.library.utoronto.ca/plagiarism
- https://www.academicintegrity.utoronto.ca/smart-strategies/

Intellectual Property Statement

Course material that has been created by your instructor (i.e. lecture slides, term test questions/solutions and any other course material and resources made available to you on Quercus) is the intellectual property of your instructors and is made available to you for your personal use in this course. Sharing, posting, selling or using this material outside of your personal use in this course is not permitted under any circumstances and is considered an infringement of intellectual property rights.

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. These are intended only for students registered in the course. Course videos and materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation, and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

Land Acknowledgement

Though we are all coming together online, we wish to acknowledge the land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

A land acknowledgement is a way of honouring the Indigenous people who have lived and worked here for thousands of years, and whose land was colonised. It is also an invitation to reflect on the history of this land and we encourage you to consider the history of the land wherever you are now.
https://www.whose.land/en/

Other resources

See this page of Quercus for a range of helpful U of T and community resources.