

# Intro to Data Analysis & Applied Econometrics

## ECO220Y1Y, Summer 2020

Prof. Stringham, Prof. Somani, and Prof. Murdock, Dept. of Economics, U of T

### 1 Key Course Information

**Sections:** L0101, L0201, L0301 (all course elements will be shared between sections)

**Instructors:** Prof. Stringham (May 4 - June 25), Prof. Somani (July 6 - Aug 27)

**Data Analysis Course Module (DACM):** Prof. Murdock (May 4 - Aug 27)

**Course Site:** <https://q.utoronto.ca/courses/154204/assignments/syllabus>

**Piazza:** <https://piazza.com/utoronto.ca/summer2020/eco220y1y>, see Section 10

**Office Hours:** Bb Collaborate on Quercus, schedule will be posted on Quercus

### 2 Online Delivery: Expectations and Requirements

This course is delivered remotely. It is asynchronous: you have some flexibility in when you view lecture and tutorial recordings, when you participate in discussions, and when you complete graded work. However, there are completion windows – including some that are relatively narrow (e.g. 12 hours on a particular date) – which means that you need to make yourself available regularly during business days when classes are in session (May 4 to June 15 and July 6 to August 17) and during the final assessment periods (June 17-25 and August 19-27).

To complete this online course, the additional requirements – beyond the basics of having your TCard (your U of T Student ID card), a handheld calculator, paper, pencils, and erasers – are:

- regular access to reliable high-speed internet and reliable electricity
- regular access to a reliable laptop and/or desktop computer (either a PC or a Mac are fine) that has a working microphone and webcam
  - a phone and/or a tablet is NOT sufficient for this course
  - also, you need a current installation of Microsoft Excel, which is available at no cost to current U of T students
- the hardware, software, and knowledge to scan your handwritten work to be uploaded
  - most phones can scan (making a separate scanner unnecessary) and we accept PDF, JPG, and PNG files

- you must scan efficiently and without creating very large files: you may need to learn about your phone or scanner, install software/updates, and/or search for solutions online
- ability to correctly convert local Toronto time to your time zone: we will not accept confusion about deadlines (given in local Toronto time) as an excuse for lateness or missed work
- being proactive to avoid technical and other difficulties, which includes submitting well before deadlines, maintaining your devices, minimizing the strains on your internet bandwidth, learning how to scan efficiently, carefully reading all assessment instructions, and contacting your instructors/TAs immediately with any problems

While you would likely find it convenient at times, you do NOT have to have access to a printer.

## 2.1 Course Website

We use Quercus: <https://q.utoronto.ca/courses/154204/assignments/syllabus>. *Please look through the entire course website after reading this syllabus, starting with the virtual tour.* Most questions students have in the first few weeks of the course can be answered by reading through the syllabus and other material on the website.

Check the course website daily, and make sure announcement notifications are turned on (<https://qstudents.utoronto.ca/notification-settings-on-the-quercus-system/>). Links to lectures, tutorials, office hours, problem sets and other materials will all be available on Quercus.

## 2.2 Instructors

Prof. Stringham is responsible for teaching all sections of the course from May 4 through June 25. Prof. Somani is responsible for all sections from July 6 through August 27. Prof. Murdock is responsible for the Data Analysis Course Module (DACM) from May 4 through August 27, which has its own syllabus – part of the DACM Handbook – available on Quercus.

We are coordinating closely to ensure a coherent course. For details on how to communicate with us, see Section 10.

# 3 Prerequisites, Academic Integrity, Accessibility & Help

An administrator will remove anyone missing [prerequisites](#). Note that we cannot waive prerequisites.

You are expected to be honest and abide by the university's principles of [academic integrity](#). This is particularly important now that in-person exams are not possible. Keep in mind that most students are honest, and those who cheat struggle in upper-year courses later in their degree.

We may use university-approved electronic proctoring software in this course. We may use Turnitin for written elements of assessments.

“Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University’s use of the Turnitin.com service are described on the Turnitin.com web site.”

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

If you have trouble, seek help right away from us, your College Registrar, and/or the [Academic Success Centre](#). For any issues that extend beyond our course, contact your College Registrar immediately.

## 4 Required Readings and Textbook

Our course includes significant required readings, which are listed in Section 13. These include important supplements available to you (at no charge) on Quercus: see the Readings page. Also, we use the 2017 *Business Statistics, Third Canadian Edition* by Sharpe, De Veaux, Velleman, and Wright, available at the [U of T Bookstore](#). Used copies are around, as this edition has been used for several years. Old editions are inconvenient. For MyStatLab (not required) go to <https://registration.mypearson.com/> using course ID instructo89852.

## 5 Lectures

Lectures recordings will be posted on Quercus each week. Any material in lectures may appear in problem sets, quizzes, and tests. ***You are not allowed to republish or share lecture videos.*** Course materials are copyrighted.

## 6 Data Analysis Course Module (DACM)

The Data Analysis Course Module (DACM) is an important course requirement. It runs throughout the summer. You will dive into real data and research and replicate key findings. There are five modules (A through E) and five online quizzes. Our Quercus site has all DACM materials, including the DACM Handbook and DACM syllabus.

## 7 Readings and Homework

The course site gives readings and homework for each week. ***Complete readings before you watch the weekly lectures.*** As you may expect, all supplements prepared specifically for our course are important requirements.

A few pointers about our required textbook: it highlights important points with boxes (sometimes in the margins). Take the boxes seriously, including “Just Checking.” Chapter openers and closers such as “What Can Go Wrong?” are always part of the required reading. Consider our textbook authors as co-instructors. Complete homework soon after each lecture.

## 8 Learning Objectives: Expected Depth of Understanding

1. Translate between plain English and statistical terms and concepts: identify key information regardless of wording and distinguish incorrect statements from correct ones
2. Select and apply a suitable quantitative approach to a new situation while making your reasoning clear: may require sentences, precise statements of hypotheses, equations, calculations, fully-labeled graphs, diagrams
3. Proficiently read output from various statistical software packages including STATA
4. Use Excel to analyze data and replicate published results
5. Correctly interpret quantitative results for a non-technical or technical audience
6. Draw valid statistical conclusions and steer clear of common pitfalls
7. Explain what would change if a researcher made different choices or the data changed
8. Identify the underlying assumptions in quantitative analyses and figure out how violations affect conclusions and interpretations
9. Read and critically evaluate analyses without being dazzled by data, methods or jargon
10. Effectively apply course concepts to a wide range of contexts from popular press articles to papers in peer-reviewed academic journals
11. Assess available data or propose a data collection plan to address a research question
12. Craft concise, clear, and coherent written arguments that directly answer asked questions

## 9 Course Assessment

There are five categories of assessment for this course: tests, participation, weekly problem sets, weekly Quercus quizzes, and DACM.

### 9.1 Marking Scheme

The test dates and availability windows are subject to change, with at least one week’s notice.

***Why is there so much term work?*** ECO220Y is extremely cumulative: each new concept requires a deep understanding of previous ones. Statistics is learned by doing the work and seeking feedback.

Assessment	Weight	Tentative Due Date(s)	Notes
Test #1	12%	Tue. 5/26	Weeks 1-3.
Test #2	15%	Fri. 6/19	Weeks 1-6, extra emphasis on weeks 4-6
Test #3	12%	Tue. 7/28	Weeks 7-9
Test #4	15%	Fri. 8/21	Weeks 7-12, extra emphasis on weeks 10-12
Participation	10%	-	Throughout the summer session
Problem sets (eleven)	15%	See schedule on Quercus	Open on Thursdays, due on Fridays
Quercus quizzes (six)	10%	See schedule on Quercus	Open on Thursdays, due on Fridays
DACM	11%	See schedule on Quercus	See DACM Handbook for details

## 9.2 Tests

While there is no university-scheduled final exam, you should think of Tests #1 and #3 as midterms and Tests #2 and #4 as final exams. Once you start a test, you will have a limited amount of time to complete the test. To accommodate students in different time zones, we plan to make the test available between 5am and 5pm on the dates specified in section 9.1.

Tests may also include an oral component conducted by an instructor or a TA virtually. We may also use university-approved electronic proctoring for tests. ***You are expected to work on all tests by yourself, proctored or not. You may not use third-party materials or communicate with others about the test.***

***Topics addressed in lectures, homework, required readings, and DACM are testable.*** If a concept appears in multiple venues, that signals high importance. Test questions are inspired by our course materials (homeworks, lectures, Quercus quizzes, DACM, readings, etc.). Tests #1 through #4 will not directly test you on your skills in doing analysis in Excel, but may include case studies from DACM and/or Excel output.

Here's our suggested strategy to prepare for tests: Work with old tests to hone your test-taking skills and assess the required depth of understanding. Construct full replies for homework and old tests/exams in test-like conditions. If you cannot solve a question after a sustained effort, turn to your notes, book, and homeworks. Only as a *last resort*, ask a person or look at the solutions. Browsing solutions (or peeking) undermines your study and robs you of practice for a test/exam. Use solutions to grade your own answers. Aid sheets for the entire course are posted on Quercus.

## 9.3 Participation

This is a completely online course. Without traditional in-person contact, it can be hard to stay engaged with the course. To motivate continued engagement with the course, 10% of your course grade has been allocated to participation. Your score on this component will be primarily based on participation in weekly tutorials, a participation interview to be scheduled during weeks 9 to 12, and possibly some other activities.

## 9.4 Weekly Problem Sets and Quercus Quizzes

Problem sets and Quercus quizzes will cover material from the most recent week of lectures. There are two objectives behind weekly problem sets and Quercus quizzes: (1) To encourage you to watch the posted lectures every week and stay on top of the course material. (2) To give you experience with the testing tools used in this course in a low-stakes setting before you work with these tools for your tests.

In total, there will be 11 graded problem sets through weeks 2 to 12. Problem sets may require you to write your answers on paper and upload to Crowdmark, type your answers in a word processor and upload to Quercus, and/or other formats. Detailed instructions will be given for each problem set. Each week's problem set will be posted on Thursday, and will be due on Friday. See the schedule posted on Quercus for more details.

In addition to the problem sets, there will be weekly Quercus quizzes, with the exception of five weeks that are reserved for an online DACM quiz. In total there will be six Quercus quizzes. ***Once you begin, you may not exit the quiz: you have a maximum of 60 minutes to finish.*** Quercus quizzes will open on Thursdays and will be due on Fridays. See the schedule posted on Quercus for more details on the availability window.

There will be a practice problem set and a practice Quercus quiz during the first week. These will not count towards your final grade. We highly recommend that you complete the practice problem set and Quercus quiz.

Excuses such as lateness, technical difficulties, forgetting about it, typing errors, improper rounding, failing to type your answers in the requested format, or unexpected interruptions after starting the quiz, will not be entertained. Start each quiz well before the deadline and when you have the uninterrupted time needed to finish it. ***How can I see my marked quiz?*** After the due date and after marking is complete, you can see the questions and your answers in Quercus.

For the problem sets and Quercus quizzes, reasonable collaboration is allowed. What is reasonable collaboration? Some students form small study groups with current classmates and meet in video chats (e.g. MS Teams) to prepare for and complete the problem sets and Quercus quizzes. This is permitted, however:

- You may NOT have anyone who is not currently enrolled in ECO220Y1Y help you with any of your online problem sets or quizzes. Tutors (paid or unpaid), friends, family, or anyone outside our current class cannot help you.
- You may NOT have anyone else solve any of your questions for you.

- You may NOT meet or communicate (by text or video) in groups larger than four people. Large groups tend to end up involving one-way distribution of answers rather than collaboration and learning.
- You may NOT post or electronically distribute anything related to the quiz questions or answers: any collaboration must be live streaming (i.e. mimic in-person collaboration).

The last bullet prohibits posting any material related to the problem sets or quizzes on social media or other platforms. After the due date for the problem set you MAY use Piazza to discuss past questions for understanding. Remember that all course materials are copyright protected and you may not distribute them outside of platforms officially sponsored by our course: Quercus and Piazza. ***If you plan to collaborate using any method other than meeting your classmates with four people or fewer, check with us BEFORE doing it.*** Also, collaboration is not required: many students prefer to work alone for various reasons (to test themselves, find it easier to concentrate, scheduling challenges, etc.).

## 9.5 Missed Term Work

To accommodate students who miss a weekly Quercus quiz or problem set due to illness, injury, personal/family problem/conflict, religious reasons, or extracurricular conflict, we will use your best 5 of 6 Quercus quizzes, and your best 10 of 11 problem sets to calculate your final grade. This also accommodates students who write an assessment in difficult circumstances, and acknowledges the continuous space of reasons for missing or doing poorly on an assessment, where most are hard to credibly document and/or are personal. ***There are no further accommodations for failing to submit a properly completed Quercus quiz and/or a problem set before the due date.***

To accommodate students who miss a test for any of the reasons in the previous paragraph or due to a conflict with graded assessments in another course, we will provide two make-up sittings, one at the end of each half of the course during the assessment period. Hence, a student that misses either Test #1 or Test#2 can write the make-up test provided during the June assessment period; a student that misses either Test #3 or Test#4 can write the make-up test provided during the August assessment period. ***Each student is allowed a maximum of one make-up sitting in lieu of missing up to one test. There are no further accommodations for missing more than one test.*** A part or all of the make-up test may be conducted orally by an instructor or a TA. Moreover, make-up tests may be cumulative, i.e. the June make-up test may cover material from weeks 1-6 and the August make-up test may cover material from weeks 7-12.

Accommodations for missing more work than addressed above (i.e. missing more than one term test, more than one problem set, and/or more than one Quercus quiz) are extremely limited: (1) an ongoing and substantial injury, illness, or personal/family problem seriously affecting the student's ability to complete term work across all courses over an extended period of time where the student's College Registrar writes to each professor after meeting with the student or (2) more than one conflict not related to injury, illness or personal/family problems where we are contacted by the student very far in advance. In these limited situations, we will consider whether accommodations can still meet all course requirements or whether the student must be advised to drop the course

and retake it when able to complete the required work.<sup>1</sup>

## 9.6 Workload and How to Succeed

Because of the accelerated summer schedule, you should expect to spend 16 hours per week on our course, including watching lectures. We highly recommend that you do not take more than two full courses during the summer, even if you are able to obtain special permission to do so. Spend most of your independent study time on actively solving problems (regular homework and old test/exam questions when reviewing) and working with the readings.

Each week includes graded content in the form of a problem set, and a Quercus or DACM quiz, which will be due on Friday. We will post the lecture recordings on Monday, but the graded content will not be available to you until Thursday. Your best course of action is to spend the first three days of the week preparing for the upcoming problem set and the quiz. This includes completing the required readings, watching the lecture recordings, doing the homework exercises, working with DACM, and participating in your live weekly tutorial.

## 9.7 Remark requests

Remark requests must: (1) Be made in an E-MAIL to Joonhwan Cho, our TA responsible for remark requests, at [joonhwan.cho@mail.utoronto.ca](mailto:joonhwan.cho@mail.utoronto.ca), subject “remark request,” (2) Explain WHY more points are justified for each disputed question. The request must also be sent within TWO WEEKS of the work being returned. The entire submission may be remarked: your mark can go up, down, or remain unchanged. However, these are given a fair look: TAs are not seeking to penalize those who have good reason to think their work was not marked correctly. Any remark requests are batch-processed after the two-week deadline, not immediately.

## 10 Communication

We use Piazza (<https://piazza.com/utoronto.ca/summer2020/eco220y1y>) to facilitate communication. The TAs and the instructors work to ensure proper usage, flag some postings, and possibly answer some questions. ***The emphasis is on student-to-student Q&A.*** It is a complement to virtual interactions in office hours, tutorials, etc. ***Piazza is a substitute for e-mail.*** For private matters or to notify us of an issue affecting our course (e.g. broken link on our course site, letter of reference, etc.), instructor emails are [tom.stringham@mail.utoronto.ca](mailto:tom.stringham@mail.utoronto.ca), [aly.somani@mail.utoronto.ca](mailto:aly.somani@mail.utoronto.ca), and [jennifer.murdock@utoronto.ca](mailto:jennifer.murdock@utoronto.ca). We will not explain course content nor reveal anything of general interest via a private e-mail exchange. ***For any question that would interest other people (e.g. upcoming test coverage, quiz solution, etc.), please post on Piazza.***

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<sup>1</sup>Any extraordinary accommodations are at our discretion and may involve a cumulative make-up test, re-weighting, and/or may be contingent on performance on other graded assessments.

## 11 Weekly TA Tutorials and TA Support

Weekly TA tutorials are an important and required part of our course. ***Your regular and active attendance counts towards your participation mark.*** At a regularly scheduled time every week you meet with roughly 30 of your peers and a TA. These are planned for the 12 weeks of classes and for 2 weeks during the final assessment periods for a total of 14 meetings, each lasting one hour. You have the opportunity to sign-up for a tutorial section: we offer a range of times on Wednesdays and Thursdays. You are expected to regularly attend every week with your tutorial section.

### 11.1 Weekly TA Tutorials: Purpose, Goals, and Expectations

Live tutorials help counteract the feeling of disconnect and isolation that can sometimes occur with online learning. Weekly tutorials give you regular opportunities to build real connections with some of your peers and a TA. These interactive tutorials combine several ideas: group office hours, moderated study groups, and traditional tutorials.

You can expect your TA to provide some structure (i.e. these will not be purely Q&A). However, your active participation is required to make these work: the TA will not be lecturing at the group for the majority of the time. While topics vary from week to week and the tutorial structures will evolve over the 14 weeks as everyone gains experience with the group dynamics and technologies, generally they will center around reviewing difficult course material and assisting you in preparing for the upcoming graded assessments (tests, quizzes, and problem sets). Also, the very first tutorial (Week 1) will not count towards your mark as we settle into our course and adjust to the online environment (where there may be technology issues to sort out). However, tutorials will begin in earnest in Week 1: do not miss out.

### 11.2 Other TA Supports for You

In addition to weekly TA tutorials, some of our TAs offer weekly office hours, participate in Piazza, host extra office hours before tests, and prepare recordings to help you work through the DACM Handbook. Make sure to take full advantage of the multiple modes of TA supports provided to you as part of our course.

## 12 Office Hours

Office hours for instructors and TAs will be held virtually: see Quercus for the schedule and details. You are encouraged to make use of office hours for questions that can't be answered by other students in Piazza. If instructor office hours become busy, note that TA office hours are frequently less busy, and our TAs are highly knowledgeable and qualified to answer questions about course content.

## 13 Topics and Required Readings

Required readings include extensive supplements created specifically for our course (marked in boldface below and available on Quercus) and our textbook. Also, the aid sheets for the entire course are posted on Quercus. Chapter numbers reference our textbook and any exclusions are noted. We finish through Chapter 11 in June and the rest in the second half of the summer.

- **“Quiz and Prerequisite Review for ECO220Y1”** pages 1 - 32
  - **“The DACM Handbook for ECO220Y1Y”** pages 1 - 177
  - Chapter 1: “An Introduction to Statistics”
  - Chapter 2: “Data”
  - Chapter 3: “Surveys and Sampling”
  - Chapter 4: “Displaying and Describing Categorical Data”
  - Chapter 5: “Displaying and Describing Quantitative Data”
  - Chapter 6: “Scatterplots, Association, and Correlation” SW11: Chapter 1, “Economic Questions and Data” pp. 1 - 13 from Introduction to Econometrics, Third Ed., 2011, by James H. Stock and Mark W. Watson
  - Chapter 7: “Introduction to Linear Regression”
  - **“Logarithms in Regression Analysis with Asiaphoria for ECO220Y1”** pages 1-28
  - Chapter 8: “Randomness and Probability”
  - Chapter 9: “Random Variables and Probability Distributions” (Excluding Sections 9.7 “The Poisson Distribution” and 9.12 “The Exponential Distribution”)
  - **“Normal Table: Read it, Use it for ECO220Y1”** pages 1 - 7
  - Chapter 10: “Sampling Distributions”
  - Chapter 11: “Confidence Intervals for Proportions”
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- Chapter 12: “Testing Hypotheses About Proportions”
  - Chapter 13: “Confidence Intervals and Hypothesis Tests for Means”
  - Chapter 14: “Comparing Two Means”
  - Chapter 18: “Inference for Regression”
  - Chapter 19: “Understanding Regression Residuals”
  - Chapter 20: “Multiple Regression”
  - Chapter 21: “Building Multiple Regression Models” emphasizing Sections 21.1 “Indicator (or Dummy) Variables,” 21.2 “Adjusting for Different Slopes—Interaction Terms,” and “Quadratics” (online)

**Make sure to visit the Readings page in Quercus.**