

AFM 113 - Spring 2022

General Information

Logistics

Instructor	Trang Bui
Lectures	Lecture notes will be posted on LEARN
Weekly tutorials (Live)	Tuesdays 10:00am to 11:30am EDT
Discussion	Piazza
Office hours	Walk-ins office hours: Tuesdays 11:30am to 12:30pm EDT Office-hour appointments: Booking link will be posted on LEARN
Contact	All course-related questions should be asked on Piazza . For external inquiries, personal matters, or emergencies, please email your instructor.
Email	tqtbui@uwaterloo.ca
TAs	TBA

Announcements and course-related materials

Announcements will be posted on both LEARN and Piazza. Course-related materials will be posted on **LEARN**.

Piazza

All course-related questions can be freely asked on Piazza. Your instructor and TAs will respond to your questions as soon as possible. Piazza is a great way to learn through discussions with fellow students, TAs and instructors. You are encouraged to utilize it fully. Our guidelines on Piazza can be found in a pinned note on Piazza. Spare some time to read the post **BEFORE** posting your first question.

Office hours

Instructor office hours will be hosted through Zoom on a weekly basis. We have one office hour right after our tutorial: Tuesdays 11:30am to 12:30pm EDT. This will be walk-in **group** office hour where you can join to ask questions and discuss together with classmates.

We will also have **up to 6** 15-minute **one-to-one** office-hour appointments with instructor each week. The link to book these appointments will be posted on LEARN.

TA office hours will be announced later on LEARN and Piazza.

Weekly tutorials (live)

Besides the lessons reading, we will have synchronous weekly tutorials on **Tuesdays from 10:00am to 11:30am EDT** on **Zoom**. The link to the Zoom meeting will be posted on LEARN. In each tutorial, we will cover

- top requested practice questions of last week,

- a quick review of concepts covered of current week,
- R tutorials of current week.

Every week there will be a post on Piazza where you can tell me which exercise or practice questions you want me to go over in the next weekly tutorial. The **top-voted 5** problems/questions/practice questions/exercises will be covered in tutorial of the following week. Video recordings of these tutorials will be made available, so it is **not required** that you attend the synchronous tutorials, but it is **encouraged** that you join, engage and participate. That will be helpful with the learning.

Required course materials

Lessons and instructional videos

All weekly lecture and tutorial notes and slides will be posted on LEARN. This is your main resource for for topics discussed in the course. Some instructional videos may also be posted to clarify challenging concepts. Only materials covered in these lessons, videos, and tutorials are going to be tested.

Textbook

- **Textbook:** Introductory Statistics Explained, by Jeremy Balka. An electronic version is available for download on LEARN.
- Students are encouraged, but not required, to read the recommended textbook sections to complement the lessons.
- Lesson material and content may deviate from the order and presentation of the textbook.
- The complementary Exercise manual is a great source to practice your knowledge and understanding about the course. Tutorials may also refer to the practice exercises in this manual.

R software

This course will introduce the basics of **R**, a very popular and useful statistical software. We will also use **RStudio** as an interface to use **R**. To download **RStudio (Free version)**, you can follow the steps below

- Download **R**, available at the following link: <https://www.r-project.org/>. (Note: when asked to select the CRAN, University of Toronto is the closest to us)
- Download **RStudio**, available at the following link: <https://www.rstudio.com/products/rstudio/download/>. Please have it downloaded onto your laptop for the first tutorial so that you can follow along.

Course contents

Course topics

Basic statistical concepts, descriptive statistics, introductory probability, sampling distributions, confidence intervals and hypothesis tests for population means and proportions, hypothesis tests for count data, nonparametric tests, simple linear regression, multiple linear regression.

Course objectives

This course is designed with the goal of educating **statistical literacy**, instead of statistical methods. In other words, our focus will be the conceptual knowledge and the analytic skill via statistical tools, which is readily applicable in business practice. At the end of this course, you will be able to

- Understand the terminology and basic concepts of randomness, probability, and statistics;
- Apply basic statistical concepts and techniques to carry out a statistical study to answer certain research questions;
- Write and use **R** code to perform analysis and interpret output.

- Understand, evaluate and critique statistical information from scientific studies and media.

Schedule

Week	Lecture topics	Textbook reference	Event
Week 1 May 2 - 6	Lesson 1: Basic statistical concepts and data collection R session 0: Introduction to R.	Ch. 1,2	Bonus Q1: Get to know you!
Week 2 May 9 - 13	Lesson 2: Descriptive statistics R session 1: Visualizing data.	Ch. 3	Assignment 1 released
Week 3 May 16 - 20	Lesson 3: The laws of probability.	4.1 - 4.5	Quiz 1: Week 1-2, Thursday, May 19
Week 4 May 24 - 27	Lesson 4: Random variables, probability functions and expectation.	5.1-3 6.1 - 6.3	Assignment 1 due Saturday, May 28 11:59pm EDT.
Week 5 May 30 - Jun 3	Lesson 5: Normal distribution. R session 2: Discrete and continuous random variables.	6.4 - 6.5	Quiz 2: Week 3-4 Thursday, Jun 2
Week 6 Jun 6 - 10	Lesson 6: Sampling distribution and confidence intervals.	Ch. 7, 8	Assignment 2 released Bonus Q2: Midterm feedback.
Week 7 Jun 13 - 17	Lesson 7: One-sample hypothesis tests.	Ch. 9	Quiz 3: Week 5-6, Thursday, Jun 16
Week 8 Jun 20 - 24	Lesson 8: Two-sample hypothesis tests. R session 3: <i>t</i> -tests.	Ch. 10 11.1-11.5	Assignment 2 due Saturday, Jun 25 11:59pm EDT.
Week 9 Jun 27 - Jul 1	Lesson 9: Other tests R session 4: Other useful tests.	Ch. 13 14.1 - 14.3	Quiz 4: Week 7-8, Thursday, Jun 30
Week 10 Jul 4 - 8	Lesson 10: Covariance and simple linear regression.	15.1 - 15.4	Assignment 3 released
Week 11 Jul 11 - 15	Lesson 11: Model assumptions and multiple linear regression. R session 5: Linear regression.	15.5 - 15.12	Quiz 5: Week 9-10 Thursday, Jul 14
Week 12 Jul 18 - 22	R session 6: Nonparametric tests		Assignment 3 due Saturday, Jul 23 11:59pm EDT.

Week 13 Jul 25 - 29	Review Tutorial: How to conduct a data analysis		Quiz 6: Week 11-12, Thursday, Jul 28 Bonus Q3: Course feedback.
Week 14 Aug 1 - 5	Finish your project		Project due Saturday, Aug 6 11:59pm EDT.

Planning your workload

You should plan to spend 3-6 hours each week for the course. This consists of reading the lessons; watching the instructional videos; (optionally reading the relevant sections in the textbook); making sure you understand the concepts and the required steps to solve the presented problems; practicing some exercises found in the Exercise manual; reaching out through Piazza if you have any concerns with the content covered; and finally submitting any due quiz or assignment.

Besides the short-time assessments such as the quizzes, you are also given long-time assessments such as the assignments and the project. For these, it is strongly recommended that you **start early** and plan to work on parts of them every week. This will guard you against any last-minute rush or unforeseeable circumstance. In addition, make use of Piazza to ask questions to help you with the assignments and project.

Some additional tips and recommendations for success are also posted separately on LEARN. If at anytime you feel like you are unable to remain connected with the course or course material please feel free to reach out to the instructor. We are here to help you succeed.

Grading scheme

Every student is treated the same way according to the grading scheme below. We cannot modify final grades to give someone an extra percent - this would be unfair to the other students. The following table represents the grade breakdown of this course.

Assessment type	Weight
Quizzes	6 x 5% = 30%
Assignments	3 x 15% = 45%
Project	25%
Bonus quizzes	3 x 2% = 6%
Total	106%

Assessments

All assessments and submissions are governed by the Academic Integrity rules as outlined in the University and Faculty Policies (Policy 71).

LEARN quizzes

There are 6 **LEARN** quizzes in total. The purpose of these is to help keep you on track with learning the course concepts and a check in to ensure that you understand the topics covered. The quizzes are NOT cumulative, and each quiz will be available for **one day** (Thursdays, 12:00am to 11:59pm EDT). You will have **only one** attempt for each quiz. Once the quiz is started, you will have **40 minutes** to complete the quiz.

These quizzes are **open-book** but should be worked on **by yourself**. It is recommended that you first review and practice the material. The quizzes will be will have approximately 10 questions each and the questions will be multiple-choice.

If there is any **technical issue** related to the quizzes, please contact your instructor via email **as soon as possible**.

If you miss a quiz, you must inform your instructor within 24 hours, providing appropriate documentation. The weight of the missed quiz (with a valid reason to a maximum weight of 10%) will be shifted to the project. No remark requests will be accepted for LEARN quizzes.

Assignments

There are 3 “take-home” assignments in this course. The purpose of these assignments is to dive a little deeper into your understanding of the course material and so that you can practice your **R** coding. You will have roughly 3 weeks to complete these and they will be submitted and graded on **Crowdmark**. It is your responsibility to make sure that once submitted your working is clearly visible, rotated properly and questions are uploaded in the correct box.

The assignments will consist of short answer questions and will require some **R** coding. Although you can discuss the assignments with fellow students for some directions/hints, the assignment submission should be worked **by yourself**, using your own understanding of the problem. Any violation to academic integrity will face serious penalties. See Section **Academic integrity** below.

A possible **4-day late submission** is permitted for assignments with 10% off the total assignment grades. No sick notes (or other reasons) will be accepted for missing the assignments.

Project

The goal of the project is to familiarize yourself with the procedure of a basic data analysis. The detailed instruction will be posted in a separate document.

You will be asked to submit your **R** code on **LEARN** and a report on **Crowdmark**. This will be an **individual** project, however, you are encouraged to discuss with fellow students about how to conduct it.

The **due date** of the project submission is on **August 6, 2022, 11:59pm EDT**. Students are encouraged to start the project early and divide the work equally throughout the term. A possible **2-day late submission** is permitted for the project with 10% off the total grade of the project. No sick notes (or other reasons) will be accepted for missing the project.

Remarks

If you have a question regarding the marking of an assignment you must first check the posted solutions. If you still have a question, then you should post a **private post** on **Piazza** including your name, your student ID, the remark question, and the suitable tag. From the time an assessment is returned to you, **you have one week (7 days) to appeal a grade (no exception for any reason)**.

No remark requests will be accepted for **LEARN** quizzes.

Other course rules

Aids and group work

Group work is **NOT** permitted on any of the assessments in this course. For the assignments and the project, you can discuss on **Piazza** about hints/directions, but the final submission should be worked **by yourself** with your own understanding. **DO NOT** post or discuss the precise solution on Piazza.

Academic integrity

Academic Integrity is seriously honored as outlined in the University and Faculty Policies (Policy 71). Actions including, but not limited to, the below will be regarded as violations to academic integrity

- using **unauthorized resources** to complete assessments;
- **copying** from other students;
- **sharing** solution.

We will be reviewing submissions for such violations. If any violations are noted, **severe** penalties can be applied.

Copyright

All material covered in AFM 113 including material discussed in the lessons, videos, course notes, and others uploaded to LEARN are copyrighted. You **DO NOT** have permission to post such information on any website, or to copy such information without the expressed permission of the instructor.

University of Waterloo and Mathematics Faculty Policies

All instructors and students must follow the following academic policies:

Academic Integrity: In order to maintain a culture of academic integrity, member of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. See: www.uwaterloo.ca/academicintegrity/ for more information.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offense, and to take responsibility for their actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. See: www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm for guidelines for the assessment of penalties.

Avoiding Academic Offenses: For more information on commonly misunderstood academic offenses and how to avoid them, students should refer to the Faculty of Mathematics Cheating and Student Academic Discipline Policy. See: http://www.math.uwaterloo.ca/navigation/Current/cheating_policy.shtml.

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. See Policy 70, Student Petitions and Grievances, Section 4: <https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70>. When in doubt, please contact the department’s administrative assistant who will provide further assistance.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes they have grounds for an appeal should refer to Policy 72 (Student Appeals). See: www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Mathematics Faculty INC Grade Policy: A grade of INC is awarded to a student who has completed course work during the term well enough that they could reasonably be expected to earn a passing mark in the course, but who was unable to complete end-of-term course requirements (usually the final exam) for reasons beyond his or her control. See: <http://www.math.uwaterloo.ca/navigation/Current/inc.procedure.shtml>.

AccessAbility Services: AccessAbility Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AccessAbility Services at the beginning of each academic term.

Writing and Communication Centre (WCC): The Writing and Communication Centre works with students in all faculties to help you consider your audience, clarify your ideas, develop your voice, and write in the style appropriate to your discipline. WCC staff offer one-on-one support for writing papers, delivering presentations, citing research, and revising for clarity and coherence. Group appointments for team-based projects, presentations, and papers are also available. You can pre-book appointments with WCC staff, or drop in at the Library for quick questions and feedback from WCC peer tutors. To book an appointment and to see drop-in hours, visit www.uwaterloo.ca/wcc. Please note that communication specialists guide you to see your work as readers would. They can teach you revising skills and strategies, but will not change or correct your work for you. Please bring hard copies of your assignment instructions and any notes or drafts to your appointment.