

**University of Guelph**  
**Department of Mathematics and Statistics**  
**STAT\*2120 – Probability & Statistics for Engineers: Winter 2020**

**Course Information**

**Instructor:** Nagham Mohammad

**Lectures:** Monday, Wednesday and Friday 10:30am - 11:20am.

**Location:** ALEX, Room 200

**TA Office Hours:** Will be posted on CourseLink.

**Instructor Information**

**Name:** Dr. Nagham Mohammad

**Office:** MACN 513.

**Email:** [naghamm@uoguelph.ca](mailto:naghamm@uoguelph.ca)

You can expect a response to emails within 24 hours Monday-Friday.

**Textbook/Course Materials**

Required textbook: Required Textbook: 9th edition of Probability & Statistics for Engineers & Scientists by Walpole, Myers, Myers and Ye. A hard copy of the text is on reserve in the McLaughlin Library Reserve Collection.

Optional: Student Solutions Manual

**NOTE:** Complete electronic copies of lecture PowerPoint slides will be posted on the CourseLink. The class lecture notes constitute study materials for exams and homework assignments.

**CourseLink:**

Course information and material (such as assignments, data sets, etc.) will be available on CourseLink. Students are responsible to check the website regularly for updated information and announcements.

**Course Description**

This introductory course is designed to give you a strong background in basic concepts of probability and statistics including methods of exploratory data analysis and statistical inference. These concepts and methods have important applications to various engineering and scientific disciplines. We will cover several examples related to real life engineering problems.

## **Learning Outcomes:**

By the end of this course, students should be able to:

- Construct and interpret graphical displays for simple data sets; calculate and interpret measures for the centre and spread of data.
- Compute the probability of various events using Venn diagrams, tree diagrams, and the addition and multiplication rules.
- Describe the concepts of mutually exclusive events, conditional probability, dependent and independent events, and Bayes theorem.
- Discuss the concepts of random variables, probability distributions, expected value and variance and identify their use in developing statistical inference tools.
- Describe the properties discrete and continuous probability distributions including the normal and t-distributions.
- Describe the concept of a sampling distribution and its use in conducting statistical inference for population parameters.
- Calculate and interpret confidence intervals and hypothesis tests involving population means, proportions and variance. Conduct a Chi-Square test of independence.
- Explain the concept of P-values in hypothesis testing.
- Conduct a hypothesis test for equality of multiple means using the ANOVA procedure.
- Calculate and interpret correlation coefficient and regression line equations; conduct statistical inference for a simple linear regression model.
- Employ statistical inference tools for quality control and reliability assessment.

## **Missed Lectures:**

If you miss lectures then you are responsible for finding out what you missed. Your instructor will not reteach missed material.

## **Out-of-Class Workload:**

As in any university course much of your learning in this course will take place outside of class time. Each week you have 3 hours of lectures. Therefore you should plan to spend 3-6 hours each week in out-of-class learning. This learning consists mostly of making sure you understand the concepts and steps that were used in class to solve problems and then solving problems from the practice problems on your own.

## **Learning Centre:**

Drop-in help is available in the Mathematics & Statistics Learning Centre (Science Commons, 3rd floor of the library) for students seeking help with course content and/or assignments. Hours of operation are Monday/Wednesday: 9:30am - 3:30pm, Tuesday/Thursday: 10am - 4pm, Friday: 9:30am - 2:30pm. Students are expected to use the Mathematics & Statistics Learning Centre as a primary resource for help with course material.

## Grading Scheme:

The grade determination for this course is indicated in the following table. A brief description of each assessment is provided below.

### Course Assessments

Assessment Item	Weight
Top Hat Questions	5%
3 Assignments	15%
Midterm Test 1	15%
Midterm Test 2	15%
Final Exam	50%

## Top Hat

To facilitate discussion and to enhance your learning in and out of class, we will be using educational software called *Top Hat*. *Top Hat* allows you to answer questions and engage in discussion using your smartphone, tablet or laptop. You will need to purchase the *Top Hat* app. Instructions for purchasing, downloading and setting up the *Top Hat* software will be provided by e-mail. **Answering Top Hat questions for another student is an academic offence.** For each Top Hat question asked during class, there will be two marks: one for answering (any answer), and another for a correct response. Only the best 75% of the Top Hat marks will be used to determine your Top Hat final grade.

**\*Note\* There are no alternate dates nor make-up for missing any Top Hat questions. Dropping the lowest 25% of top hat marks is meant to take into account any absences.**

## Midterm Tests:

There will be 2 Midterm Tests; venues and material to be covered will be announced closer to the Midterm date.

**Midterm Test 1: Wednesday February 12<sup>th</sup>, 10:30-11:20am**

**Midterm Test 2: Wednesday March 18<sup>th</sup>, 10:30-11:20am**

**\*Note\* There are no alternate test dates nor make-up. If a midterm test is missed for a valid reason, the weight from that test will be carried to the final exam.**

## Final Examination:

A two hour final examination will be held on **Thursday April 16<sup>th</sup>, 11:30am- 1:30pm.** Please do not make any travel arrangements. Information regarding midterm tests, and final exam (e.g. material covered and locations) will be posted on the CourseLink. Students must present a valid Student ID card to write all tests and final exam.

**Software:** Assignments, tests and final exam will involve the use of statistical software package R. You can download a free copy on your own computer from the website:

<http://www.r-project.org/>

### **Assignments:**

There are 3 scheduled Assignments. See the course schedule below.

### **Assignment Policies:**

- No late assignments will be accepted, and late or missed assignments will automatically receive a grade of 0.
- While you are encouraged to discuss approaches to assignment questions with other students, your submitted assignment must be your own work. Copying any part of another student's work is considered academic misconduct. (Please read the section on academic misconduct at the end of this document and in the undergraduate calendar.)
- Assignments will be submitted through Crowdmark.

**\*Note\* There are no alternate assignment dates nor make-up.**

### **Calculator Policy:**

For the Midterm tests and final exam, only a non-programmable, non-graphical **are allowed.**

### **Remarking of Tests:**

If you have a question regarding the marking of a test you must first check the posted solutions. If you still have a question, then you should follow the procedure posted on the CourseLink.

**You have 7 days to appeal a test grade.**

### **Missed Midterm Tests or Final Exam:**

The final exam (date, time and location) is scheduled by the Registrar's Office. Students who miss the final exam due to a valid, documented reason must contact their program counsellor for advice on University regulations regarding final exams.

**\*Note\* If a midterm test is missed for a valid reason, the weight from that test will be carried to the final exam.**

### **Drop Date:**

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

## **University Policies**

### **Academic Consideration**

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for academic consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

### **Academic Misconduct**

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

### **Accessibility**

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website:

<http://www.uoguelph.ca/csd/>

### **Course Evaluation Information**

Please see

<http://www.mathstat.uoguelph.ca/files/TeachevaluationformF10.pdf>

**STAT\*2120 Winter 2020 Course Schedule (Tentative)**

The following table gives a tentative schedule for the material covered with modules in Course Notes indicated.

<b>Week</b>	<b>Topics</b>	<b>Notes</b>
1. Jan. 6-10	Introduction  Chapter 2: Probability.	<b><u>Self-study</u></b>  Chapter 1: Introduction to Statistics and Data Analysis
2. Jan. 13-17	Chapter 2: Probability.  Chapter 3: Random Variables and Probability Distributions.	
3. Jan. 20-24	Chapter 3: Random Variables and Probability Distributions  Chapter 4: Mathematical Expectation.	
4. Jan. 27-31	Chapter 5: Some Discrete Probability Distributions.	<b><u>Assignment 1</u></b>  Wednesday, Jan. 29, 10:00am
5. Feb. 3-7	Chapter 5: Some Discrete Probability Distributions  Chapter 6: Some Continuous Probability Distributions.	
6. Feb. 10-14	Chapter 6: Some Continuous Probability Distributions.  Review for Midterm 1	<b><u>Midterm 1</u></b>  Wednesday Feb. 12 10:30-11:20am
Reading Week Feb17-21	Winter Break No Classes and No LABS	

7. Feb. 24-28	Chapter 8: Fundamental Sampling Distributions and Data Descriptions.  Chapter 9: One- and Two-Sample Estimation Problems	
8. Mar 2 -6	Chapter 9: One- and Two-Sample Estimation Problems	<u>Assignment 2</u> Wednesday, Mar. 11 <sup>th</sup> 10:00am.
9. Mar. 9-13	Chapter 9: One- and Two-Sample Estimation Problems.  Review for Midterm 2	
10. Mar. 16-20	Chapter 10: One- and Two-Sample Tests of Hypotheses.	<u>Midterm 2</u> Wednesday March 18 <sup>th</sup> 10:30-11:20am
11. Mar. 23-27	Chapter 10: One- and Two-Sample Tests of Hypotheses.  Chapter 11: Simple Linear Regression and Correlation.	
12. Mar. 30-April 3	Chapter 11: Simple Linear Regression and Correlation.  Review for the Final Exam	<u>Assignment 3</u> Wednesday, April, 1 <sup>st</sup> 10:00am