STAT*2120
Probability & Statistics For Engineers
Winter 2018

(Revision 0: November 13th, 2017)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Kimberly M. Levere, Ph.D.
Office: MacN 539, ext. 56908
Email: klevere@uoguelph.ca
Office hours:

1.2 Teaching Assistants

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the STAT*2120 Courselink website. You are responsible for keeping up-to-date on this site.

2.2 Required Resources

1. The course manual *STAT*2120 – Probability & Statistics For Engineers - Course Manual 7th Edition)*, is available at the MacNaughton Bookstore. This is the primary resource for the course and will be completed in class as the course progresses. Please be sure that you have the current version – the 7th edition - (only available in the MacNaughton bookstore) as a number of changes have been made to last semester's manual.

2. The *STAT*2120 For You to Try Manual* (4th Edition) is also available at the MacNaughton Bookstore. In response to the request for "more questions written by Kim" in course evaluations, I have constructed a manual of questions (with final answers) that have all be written by me! They are separated by section so that you can follow along with the material in class. Some concepts are taught through these exercises, so it is important that you complete them, plus they will help you to practice.

2.3 Recommended Resources

You should have more than enough to practice with between the FYTT manual, past tests/quizzes and online quizzes. If you still want more, virtually any entry level probability and statistic textbook will do just fine.

Lecture Information:

It is strongly recommended that you attend every class. We will complete the course manual together during lectures so please bring it to every class. **Due to low attendance in the past as well as copyright issues, I will NOT be posting my completed notes online.**

2.4 Communication & Email Policy

Please use office hours and Courselink discussion forums as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.1 Dates and Distribution

Your grade will be determined using the following grading scheme:

Grading Scheme
4 in-class Quizzes 20%
Online Mini-quizzes 10%
Midterm 30%
Final Exam 40%

**You must receive at least 50% of the marks available, in total, on the in-class quizzes, midterm, and final exam that are used to calculate your final grade. That is,

(Total marks earned on all tests and exam) ÷ (Total marks available on all tests and exam) ≥ 50%

If you do not achieve this, your maximum possible final grade will be 48%, *no matter what grade you receive on the Mini-quiz component*. Considerations may be made according to the policies listed in Section 3.2.

In-class Quizzes: Quizzes will be worth 5% each will cover approximately 2-3 weeks of lecture material. Quizzes will be short, independent, 20-minute assessments that will test your understanding of current topics in the course. To help you to practice and prepare, I have constructed a For You to Try Manual with similar-spirited questions. Here is the schedule of dates:

Quiz 1: Friday, January 26th, 2018 (Week 3).

Quiz 2: Friday, February 9th, 2018 (Week 5).

Quiz 3: Friday, March 16th, 2018 (Week 9).

Quiz 4: Wednesday, March 28th, 2018 (Week 11).

Online Mini-quizzes: The online mini-quizzes are designed to help you identify the details and pitfalls of the problems in this course. Each question will give you feedback on what you might be doing incorrectly so that you can correct these errors and perform more favourably on the more expensive assessments in the course.

Having taught this course many times, I have noticed that students often struggle to identify which type of problem they are doing when they are not organized by chapter. To help you get good at this and build your own methods for problem identification, I have constructed online mini-quizzes that span multiple chapters.

The details

- 10% total (equally divided)
- two hours to complete (although this should be way more time than you need!)
- one attempt at each
- each covers material from designated chapters of our notes (specified in the quiz title).

I will post a quiz only after we have covered the material necessary to complete it. While I recommend that you keep up with these quizzes as the course progresses, you may **complete these quizzes any time after they have been posted until Friday, April 6th, 2018 at 5:00pm when all quizzes will close.**

Midterm and Final Exam:

Midterm: Friday, March 2nd, 2018, 5:30pm-7:15pm (Week 7)
Location: TBA

Final Exam: TBA
Location: TBA.

3.2 Course Grading 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 number, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration:
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor at the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Missed midterm tests: Missed quizzes or midterms will receive a grade of 0%, unless they are missed due to any of the above reasons, in which case the weight of the missed test or quiz will be added to the midterm (for Q1 and Q2) or the final exam (for the Midterm, and Q3, Q4). There will be no makeup midterm or quizzes. Since the online miniquizzes can be done at any time, you should budget your time accordingly to ensure that you are able to complete these. Only miniquizzes that open within the last two weeks of class will have a transferrable weight to the final exam with valid documentation (except in extenuating circumstances).

Passing grade: In order to pass the course, you must receive a final grade of at least **50%**. Additionally, in order to pass this course, you must receive at least 50% of the marks available, in total, on the in-class quizzes, midterm and final exam that are used to

calculate your final grade. If you do not achieve this, your maximum possible final grade will be 48%.

Copies of out-of-class assignments: Keep paper and/or other reliable back-up copies of all out-of-class assignments (for instance, the work you did for the mini-quizzes). You may be asked to submit this work at any time.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

The topics covered in this course include: Sample spaces; probability, conditional probability and independence; Bayes' theorem; probability distributions; probability densities; algebra of expected values; descriptive statistics; inferences concerning means, variances, and proportions; curve fitting, the method of least squares and correlation. An introduction to quality control and reliability is provided. This course is recommended for students in the B.Engg program.

Credit Weight: 0.5 **Department:** Mathematics & Statistics **College:** CEPS **Campus:** Guelph

Prerequisite: 1 of IPS*1510, MATH*1210, MATH*2080

Restrictions: STAT*2040, STAT*2060, STAT*2080, STAT*2100

4.2 Course Aims

This course is an introductory course in probability and Statistics. The objective of the course is to give you a strong statistical background that you will require as you progress through your degree and beyond. The main goals of the course are (1) to teach students the concepts listed in section 4.1 at a level that promotes a deep understanding and (2) to explain how such concepts are applicable in their various degrees by exploring real-world problems.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Calculate and analyze basic descriptive statistics.
2. Compute the probability of simple and compound events.
3. Comprehend the notions of random variables, probability distributions, expected value and variance and use them to develop statistical methods.
4. Be comfortable with well-known discrete probability distributions and calculating associated probabilities.
5. Master the normal and t-distributions, be aware of their shapes and properties and how to calculate associated probabilities.

6. Comprehend the notion of a sampling distribution and know the sampling distribution of the sample mean, and sample variance under various circumstances.
7. Construct a confidence interval and carry out a hypothesis test on a mean, proportion, variance (or differences of two populations of these).
8. Interpret confidence intervals and hypothesis tests and use them to make statistical decisions.
9. Be able to conduct a hypothesis test for count data.
10. Compare multiple means using an ANOVA table.
11. Conduct hypothesis tests and build confidence intervals concerning the slope of a regression line.
12. Have a basic understanding of how statistics can be used in risk and reliability assessment.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1-15	Quizzes, FYTT problems, Exams, Mini-quizzes
2. Problem Analysis	1-15	Quizzes, FYTT problems, Exams, Mini-quizzes
3. Investigation	1-15	Quizzes, FYTT problems, Exams, Mini-quizzes
4. Design	-	-
5. Use of Engineering Tools	-	-
6. Communication	1-15	Quizzes, Mini-quizzes FYTT problems, Exams, Mini-quizzes
7. Individual and Teamwork	1-15	Quizzes, FYTT problems, Exams, Mini-quizzes

8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	-	-
10. Ethics and Equity	-	-
11. Environment, Society, Business, & Project Management	-	-
12. Life-Long Learning	-	-

4.5 Instructor's Role and Responsibility to Students

As your instructor, I must:

1. Develop and deliver course material in a professional way that facilitates learning for a variety of students and learning styles;
2. Attend all lectures, filling in the course notes as we proceed in each lecture.
3. Respond to you. This includes, as time permits, questions in lectures, after classes, during office hours, or through email (where I reserve the right to reply within a timeframe of 1-2 days). You are more than welcome to contact me at any time through these means if you have questions or concerns about the course or the course material.
4. Evaluate you fairly, and fairly as compared to your peers, providing prompt feedback on your performance and justification for your grade. I must provide academic consideration, where appropriate, as described in Section 3.

4.6 Students' Learning Responsibilities

As a member of this class, you are expected to:

1. Take advantage of the learning opportunities provided during lectures and on assignments;
2. Treat others with respect and dignity whenever you address them, in-class or online.
3. Genuinely attempt assignment questions, and complete an appropriate number of practice problems from the textbook in a timely manner, including assignments, on your own time;
4. Seek help if you have tried the assignment questions and/or textbook exercises and are still having difficulty with the course content. This means contacting me (*not* just at the last minute!) and possibly considering other resources as I recommend them to you;
5. Check all grades against tests that have been returned to you, once they are posted to the Course website, to verify that the correct mark has been recorded.
6. Notify me, as described in Section 3, in the case that there are missed tests or academic conflicts that are known in advance. If illness, work, or extra-curricular activities are

causing you to struggle, you are advised to keep me up-to-date on your progress, so that I can be more helpful to you.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures (Dr. Levere):

Monday	3:30 pm – 4:20 pm	ALEX*200
Wednesday	3:30 pm – 4:20 pm	ALEX*200
Friday	3:30 pm – 4:20 pm	ALEX*200

5.2 Lecture Schedule

(schedule is approximate and subject to change depending on time constraints)

Lectures (Week)	**Lecture Topics**	**References**
Self-study	Introduction and Descriptive Statistics	Chapters 1 & 2
0-1	Probability	Chapter 3
2	Discrete Probability Distributions	Chapter 4
3	Continuous Probability Distributions	Chapter 5
4-5	Sampling Distributions	Chapter 6
5-6	Inferences Concerning a Mean	Chapter 7
6-7	Two-Sample Inference Procedures for Means	Chapter 8
7-8	Inference Procedures for Proportion(s)	Chapter 9
8-9	Inference Procedures for Variance(s)	Chapter 10
9-10	Inference Procedures for Variance(s)/ANOVA	Chapter 10 & 11
10-11	Analysis of Variance	Chapter 11
12	Introduction to Linear Regression	Chapter 12

5.3 Lab Schedule

Not applicable.

5.4 Other Important Dates

First day of classes: Monday, January 8th, 2018.
Reading Week: Monday, February 19th, 2018-Friday, February 23rd, 2018. (no classes)
40th Class Day: Friday, March 9th, 2018.
Good Friday: Friday, March 30th, 2018. (no classes)
Last day of classes: Friday, April 6th, 2018.

Drop Date: Courses that are one semester long must be dropped by the end of the fortieth class day (**Friday, March 9th, 2018)**; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Course Evaluation Information: Near the end of the term, you will be given the opportunity to evaluate your instructor and provide comments regarding your experience. The evaluations for this class will be done in-class. Your instructor will inform you of when these are to take place.

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6 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.

6.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

7 ACCESSIBILITY

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

8 RECORDING OF MATERIALS

Presentations which are made in relation of course work – including lectures – cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

http://www.uoguelph.ca/registrar/calendars/index.cfm?index