Mathematics 1550H (Section A) − **Probability I: Introduction to Probability**
Trent University, Winter 2023

Instructor

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Department of Mathematics

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Prerequisite: MATH 1005H or 1110H or permission of the instructor.

Text

No textbook required; we will be using lecture notes, which will be posted on Blackboard, prepared by J. Talboom & A. Erzurumluoglu as a framework. Another take on the material can be found in *Introduction to Probability*, by Grinstead and Snell, which will also be posted to Blackboard.

Meetings

Lectures: Mondays 10:00-11:50 and Wednesdays 12:00-12:50, both in SC 137.
Seminars: §01 Friday 12:00-12:50, §02 Friday 09:00-09:50, §03 Friday 10:00-10:50, §04 Friday 11:00-11:50, all in ENW 106, and §05 Wednesday 11:00-11:50 in ENW 108.

Marking scheme

There will be 11 weekly mini-assignments (posted on Blackboard on Fridays and due the next Tuesday evening), 2 in-person tests (in class on Wednesday at 12:00 on 8 February and 15 March), and an in-person final exam. These will weigh as follows in the final mark:

Best 10 Mini-Assignments (3.5% each)	35%
Tests (15% each)	30%
Final Examination	35%

At least 25% of the course marks will be obtained by the final date (Friday, 10 March) to withdraw from Winter courses. Students who miss an assignment for reasons beyond their control should contact the instructor as soon as possible. Please note that to obtain full marks, solutions must be well-presented.

This scheme may also be modified for individual students in exceptional circumstances, such as a lengthy absence due to illness. Any such modification will require the agreement of both the student and the instructor.

Content & Learning Outcomes

MATH 1550H is an introduction to probability theory, covering basic concepts and results about probability, random variables, discrete and continuous distributions, expected value, and variance. After successfully completing the course a student should be able to:

1. Develop counting techniques used to calculate discrete probabilities.
2. Define and recognize sample spaces, continuous and discrete random variables and events.
3. Understand rules of probability.
4. Calculate probabilities and conditional probabilities of events.
5. Use (joint) probability distribution and density functions (including some special distributions and densities) to calculate probabilities.
6. Approximate probabilities in certain situations; *e.g.* using Chebyshev's Theorem or using the binomial distribution to approximate the normal distribution (or *vice versa*).
7. Find expected values and moments of random variables, including joint random variables.
8. Identity applications to real life situations; e.g. games of chance, quality control, decision making.

Schedule

Please note that where the material covered is concerned, the schedule below is tentative: the pace and order of material may be adjusted as necessary or convenient. . . .

Week 1. *(9-13 January) Classes begin on Monday, 9 January.* Counting techniques.

Week 2. *(16-20 January)* More counting techniques. Mini-Assignment #1 due on Tuesday, 17 January.

Week 3. *(23-27 January)* Sample spaces, events, probabilities. Mini-Assignment #2 due onTuesday, 24 January.

Week 4. *30 January – 3 February)* Independent events, Bayes' Theorem. Mini-Assignment #3 due on Tuesday, 31 January.

Week 5. *(6-10 February)* Probability distributions and densities Mini-Assignment #4 due on Tuesday, 7 February. Test #1 written in class on Wednesday, 8 February.

Week 6. *(13-17 February)* Joint distributions and densities. Mini- Assignment #5 due on Tuesday, 14 February.

~~**Catch-up**~~ **Reading Week.** *(20-24 February)* Enjoy!

Week 7. *(27 February – 3 March)* Expected value. Mini-Assignment #6 due on Tueday, 28 February.

Week 8. *(6-10 March.)* Expected value. Mini-Assignment #7 on Tuesday, 7 March. *The last date to withdraw from Winter courses is Friday, 10 March.*

Week 9. *(13-17 March)* Moments, Chebyshev's Theorem. Mini-Assignment #8 due on Tuesday, 14 March. Test #2 written in class on Wednesday, 15 March.

Week 10. *(20-24 March)* Special probability distributions. Mini-Assignment #9 due on Tuesday, 21 March.

Week 11. *(27-31 March)* Special probability densities. Assignment #10 due on Tuesday, 28 March.

Week 12. *(3-6 April)* Functions of random variables. Assignment #11 due on Tuesday, 4 April. *Thursday, 6 April, is the last day of classes. University closed on Good Friday, 7 April.*

Winter Examination Period. *(11-24 April)* The final examination will be scheduled during this period.

Academic Integrity

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from a 0 grade on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more: `www.trentu.ca/academicintegrity`

For clarity, the following guidelines will apply in MATH 1550H, Section A:

You are permitted and encouraged to work together and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the mini-assignments, and to use what software and consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by yourself, giving due credit to all relevant sources of help and information**. You may not give or receive any aid, nor use any references or computational tools, on the tests and exams without the explicit permission of the instructor or as a necessary accommodation cleared with SAS.

Note that students are normally expected to attend all lectures and seminars that they are registered in. It is the responsibility of the student to get caught up on any missed content. There will be no late/early writing of tests, or make up tests. Any missed tests or assignments will receive a grade of zero. Exceptions may be made in special circumstances; if these are foreseeable, students should probably discuss necessary accommodations with SAS and/or the instructor as soon as possible.

Access to Instruction

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and/or health consideration and feels that he/she may need accommodations to succeed in this course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible.

Archive Page

A web page at `euclid.trentu.ca/math/sb/1550H/` *archives material from a number of previous iterations of this course taught by the instructor.*

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