

## Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Winter 2017

[In Peterborough!]

MATH 1550H is an introductory probability course, with an emphasis on the foundations required to understand probability models and statistical methods.

### Instructor

Stefan Bilaniuk (pronounced Стефан Біланюк)

office: GCS 337

Office hours: Tuesday 11:00-11:50, Thursday 10:00-10:50, and  
Friday 09:00-10:50, or by appointment, or just drop by!

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### Department of Mathematics

Gina Collins

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### Prerequisite

MATH 1005H, or MATH 1100Y/1101Y, or MATH 1120H, or permission of the instructor. MATH 1100Y or MATH 1120H may be taken as a co-requisite.

### Text

*Introduction to Probability* (2nd Edition), by C.M. Grinstead and J. Laurie Snell, American Mathematical Society, 2003. It is available for free at: [www.math.dartmouth.edu/~prob/prob/prob.pdf](http://www.math.dartmouth.edu/~prob/prob/prob.pdf)

Various additional resources for this text can be found at:

[www.dartmouth.edu/~chance/teaching\\_aids/books\\_articles/probability\\_book/book.html](http://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/book.html)

### Meetings

Lectures: Tuesday 09:00-10:50 in GCS 114 and Thursday 09:00-09:50 in GCS 114.

Workshops: Tuesday 16:00-16:50, or 17:00-17:50, or 18:00-18:50 in CCN M2; students normally attend one workshop each week.

### Marking Scheme

There will be at least nine quizzes, at least four assignments, a test, and a final examination. Quizzes will normally be written in the Friday lectures and last between ten and fifteen minutes apiece. The assignments will usually be handed out and collected every third Friday. The test will last fifty minutes and will probably be written during the lecture period on Thursday, 2 March. The final examination will last three hours and will be written as scheduled by the Registrar's Office during the examination period (10–26 April). These will weigh as follows in the final mark:

|                              |     |
|------------------------------|-----|
| Best 8 quizzes (3% each)     | 24% |
| Best 3 assignments (8% each) | 24% |
| Test                         | 15% |
| Final Examination            | 37% |

At least 25% of the course marks will be obtained by the final date (Friday, 10 March) to withdraw from Winter half-courses. Students who miss the test, or more than one quiz, or are unable to hand in their assignments on time for reasons beyond their control should contact the instructor as soon as possible.

This scheme may 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. Upon successful completion of this course, a student should be able to have knowledge of some counting techniques, understand the concepts of independence of random variables and events, conditional probability, distinguish between discrete and continuous random variables, and understand the content of probability and density functions; recognize various discrete and continuous random variables, compute their expectations and variance, and apply their knowledge to simple modelling problems; have some elementary knowledge of bivariate distributions and joint probability distributions; and understand the statements of the Laws of Large Numbers, Chebyshev's Inequality, and the Central Limit Theorem.

## Readings & Schedule

Please note that where the material covered is concerned this schedule is a polite fiction: no lesson plan survives contact with actual students unchanged! Additional material, including some not in the text, may be covered on assignments and in class, and other sources may be used to augment the text.

**Week 1.** (9–13 January) [Chapters 1 & 2] Discrete probability distributions and continuous probability densities. *No workshops this week.*

**Week 2.** (16–20 January) [Chapter 3] Counting discrete outcomes, permutations and combinations. Quiz #1 written on Thursday, 19 January.

**Week 3.** (23–27 January) [Chapter 4] Discrete and continuous conditional probability. Quiz #2 written and Assignment #1 due on Thursday 26, January.

**Week 4.** (30 January – 3 February) [Chapter 5] Important discrete distributions. Quiz #3 written on Thursday, 2 February.

**Week 5.** (6–10 February) [Chapter 5] Important continuous densities. Quiz #4 written on Thursday, 9 February.

**Week 6.** (13–17 February) [Chapter 6] Expected value and variance. Quiz #5 written and Assignment #2 due on Thursday, 16 February.

**Winter Reading Week.** (20–24 February) Enjoy!

**Week 7.** (27 February – 3 March) [Chapters 6 & 7] More on expected values and variance, random variables, sums of random variables. Test written on Thursday, 2 March.

**Week 8.** (6–10 March) [Chapters 7 & 8] More on sums of random variables, Laws of Large Numbers. Quiz #6 written Thursday, 9 March. *The last date to withdraw from Winter half-courses is Friday, 10 March.*

**Week 9.** (13–17 March) [Chapter 8] Laws of Large Numbers, Chebyshev's Inequality. Quiz #7 written and Assignment #3 due on on Thursday, 16 March.

**Week 10.** (20–24 March) [Chapter 9] Independent trials of discrete and continuous random variables. Quiz #8 written on Thursday, 23 March.

**Week 11.** (27–31 March) [Chapter 9] Central Limit Theorem. Quiz #9 written on Thursday, 30 March.

**Week 12.** (3–7 April) Friday, 7 April, is the last day of classes. Clean-up and review. Possible Quiz #10 written and Assignment #4 due on Thursday, 6 April.

**Winter final examination period.** (10–26 April) Watch for the exam schedule to find out when and where the MATH 1550H final will be written.

## Academic Integrity

*Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure 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](http://www.trentu.ca/academicintegrity).*

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

You are permitted and encouraged to work with others and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the assignments, and to 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. For the quizzes, test, and final exam, you may not give or receive any help**, nor use any aids except for a calculator (any that you like) and one letter- or A4-sized aid sheet with whatever you want on (all sides!) of it, except with the instructor's express permission.

## Access to Instruction

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

## Web page

This course will not make use of Blackboard. It will, however, have a web page at

[euclid.trentu.ca/math/sb/1550H/](http://euclid.trentu.ca/math/sb/1550H/)

with hopefully-up-to-date information and all handouts.

*Last updated 2017.01.09.*