STAT 4501 / STAT 5900 I

| Term: | Fall 2022 | | |
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| Instructor: | Professor B. Szyszko | owicz | Email: bszyszko@math.carleton.ca |
| Office: | 5249 HP | | Phone: 520-2600 ext. 2140 |
| Lectures: | Tuesday, Thursday 11:30 – 1:00, SA 314 | | |
| Grade: | Term Work (40%): Test 1 (20%) October 18 | | |
| | Test 2 (20%) November 22 | | |
| | Final Exam (60%): | Three hour clo | osed book exam based on the whole term |
| Text: | An Introduction to Probability and Statistics, 2 nd edition, by Rohatgi & Saleh | | |
| | A Course in Probability Theory, by K.L.Chung – additional reference | | |
| | | rec | commended for graduate students |

Course Outline:

- Week 1: Classes of Sets. Definition of Probability Measure
- Week 2: Properties of Probability Measure. Random Variables and their Distributions
- Week 3: Moments. Markov's Inequality. Moment Generating Function. Random Vectors
- **Week 4 :** Modes of Convergence (almost sure, in probability, in distribution, in L^p).
- Week 5: Modes of Convergence (continuation).
- Week 6: Convergence a.s. Borel-Cantelli Lemmas.
- Week 7: Weak Law of Large Numbers.
- Week 8: Kolmogorov's Inequality. Kolmogorov's Strong Law of Large Numbers.
- Week 9: Kolmogorov's Three Series Theorem. Consistency (weak and strong) of estimators.
- Week 10: Moment Generating Function. Characteristic Function. Continuity Theorem. Central Limit Theorem for i.i.d. Random Variables.
- Week 11: The Lindeberg-Feller Central Limit Theorem. Asymptotic Normality.
- Week 12: The Glivenko-Cantelli Theorem.

Note: The above is an approximate outline only. You are responsible for making sure that you keep up with what is being done in class and with any changes announced in class/ Brightspace. Brightspace will be used to post material related to this course. In this course I will be using my own notes. The role of books will be explained during the first class.

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This course is recommended for graduate and upper level undergraduate students who would like to learn some basic notions of Probability Theory with emphasis on Limit Theorems. Basic concepts like Axioms of Probability, Random Variables and Their Distributions, Moments and Generating Functions, Random Vectors, will be briefly covered (only to the extent needed in this course). Full proofs will be given when possible. The other results (with proofs on the more advanced level, or not important at a given stage) will be discussed with their proofs indicated and references provided.

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If there is any student in this course who, because of disability, may have need for special accommodations, please come and discuss it with me. Students must also contact Paul Menton Centre to obtain a Letter of Accommodation for such an arrangement.