

STAT 4507/STAT 5501
Statistical Inference/Mathematical Statistics II

COURSE OUTLINE

Term: Winter 2020
Instructor: Dr. Natalia Stepanova
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Office: 5229 HP
Phone: 613-520-2600, ext. 1272
Office hour: Tuesday, 1:30 pm – 2:30 pm, or by appointment
Lectures: Tuesday, 11:35 am – 12:55 pm Room: RB 1200
Thursday, 11:35 am – 12:55 pm Room: RB 1200
Grades: Final Exam: 50% Midterm Test: 30% Assignments: 20%
Text: *Statistical Inference*, 2nd ed., by George Casella, Roger L. Berger
References: *Testing Statistical Hypotheses*, by E. L. Lehmann; *A First Course in Mathematical Statistics*, by G. Roussas; *Mathematical Statistics*, by P. Bickel and K. Doksum

There will be **four** assignments. All assignments count towards the term mark. Late assignments will not be accepted. Due dates for assignments are tentatively scheduled for February 13, March 5, March 19, April 2. There will be also problem sets. They will be given for your practice and will not be counted towards the term mark. There will be one **80-minute** midterm test written in class during regular lecture hours on Tuesday, **March 3**.

Important Notes:

- If you miss the midterm test you will receive a zero unless you provide me with a proper documented reason (e.g., medical), in which case the weight of the midterm test will be shifted to the final exam. The same rule applies to each assignment.
- All assignments, problem sets, and announcements will be posted on the course web page on CU Learn on a regular basis.
- Students wishing to see their final examination papers must make an appointment within three weeks of the examination to do this. Please note that I do not change your grade on the basis of your needs (such as scholarships, etc.).

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website <http://www2.carleton.ca/equity/accommodation/>.

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website <http://www2.carleton.ca/equity/accommodation/>.

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing,

and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable) at <http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/>. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://www2.carleton.ca/equity/>.

Academic Integrity: The University states unequivocally that it demands academic integrity from all its members. Academic dishonesty, in whatever form, is ultimately destructive to the values of the University. Students who violate the principles of academic integrity through dishonest practices undermine the value of the Carleton degree. Dishonesty in scholarly activity cannot be tolerated. Any student who violates the standards of academic integrity will be subject to appropriate sanctions.

Important dates:

- January 6, 2020 Winter term classes begin.
- January 17, 2020: Last day for registration. Last day to change courses or sections for winter and fall term courses.
- January 31, 2020: Last day to withdraw from winter term courses with a full fee adjustment.
- February 14, 2020: April examination schedule available online.
- February 17, 2020: Statutory holiday. University closed.
- February 17-21, 2020: Winter break, no classes.
- March 13, 2020: Last day to request formal exam accommodations for December examinations to the Paul Menton Centre for Students with Disabilities.
- April 7, 2020: Last day of winter term classes. Last day for academic withdrawal from winter term courses.
- April 10, 2020: Statutory holiday. University closed.
- April 13-25, 2020: Final examinations in winter term courses will be held.

The course topics below include Chapters 8 and 9 in the text, and some other topics of the classical theory of hypothesis testing.

COURSE TOPICS

Part I: Hypothesis Tests. General concepts of the Neyman-Pearson testing hypotheses theory; UMP tests for testing a simple hypothesis against a simple alternative; UMP tests for testing certain composite hypotheses, UMP unbiased tests; Bayesian tests, minimax tests. Tests in parametric models (likelihood ratio tests, chi-square tests, Bayesian tests) and their properties. Tests in nonparametric models (sign, rank, and permutation tests, Kolmogorov-Smirnov and Cramér-von Mises tests) and their properties. Asymptotic relative efficiency of tests.

Part II: Confidence Sets. Definition of a confidence set and some examples; construction of confidence sets (pivotal quantities, inverting acceptance regions of tests, Bayesian intervals); criteria for selecting interval estimators, properties of confidence sets, asymptotic confidence sets.