University of International Business and Economics
International Summer School

STAT 205 Probability Theory

Term: May 27 – June 27, 2019
Instructor: Jingzhi Tie
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Class Hours: Monday through Thursday, 120 minutes each day
Office Hours: TBD
Discussion Session: 2 hours each week

Total Contact Hours: 66 contact hours (45 minutes each)
Credit: 4 units

Course Description:
Introducing probability and statistical inference. The course has a prerequisite of differential and integral calculus. We will use Chung and AitSahli for basic materials, and Tijms' book for examples.

Course Goals:
A student who satisfactorily completes this course will be able to:

✧   understand the basic rules of probability conditional probability. and expectation
✧   apply Bayes' theorem on changing conditional probabilities with new evidence;
✧   understand the difference between discrete and continuous random variables;
✧   work easily with several common distributions, discrete and continuous;
✧   understand the central limit theorem;
✧   understand the difference between point estimates and inference by confidence intervals, the strengths and limits of both;
✧   engage in critical evaluation of statistical evidence, and experimental design.

Required Textbook:
David F. Anderson, Timo Sepalainen and Benedek Valko, Intorduction to Probabilty, Cambridge University Press, ISBN: 9781108415859.
Henk Tijms – Probability: A lively Introduction, Cambridge University Press,
ISBN 9781108407847

Grading Policy:
Grading will be determined by a combination of class attendance and participation, and the results of your exams.
Attendance and Participation   10%.

Midterm Exam   30%.
Final Exam   60%.

Grading Scale:
Assignments and examinations will be graded according to the following grade scale:

A	90-100	C+	72-74
A-	85-89	C	68-71
B+	82-84	C-	64-67
B	78-81	D	60-63
B-	75-77	F	below 60

Class Rules:
Students are expected to come to lecture having read the material assigned for the day, and prepared to engage in active discussion about those ideas.

Attendance Policy:
Summer school is very intense and to be successful, students need to attend every class. Occasionally, due to illness or other unavoidable circumstance, a student may need to miss a class. UIBE policy requires a medical certificate to be excused. Any unexcused absence may affect the student's grade. Moreover, UIBE policy is that a student who has more than 1/3 (6 times) of the class in unexcused absences will fail the course.

Course Schedule:

Week One.
Monday: Chapter one Axioms of probability, sampling, review of counting, infinitely many outcomes.
Tuesday: review of the geometric series, Rules of probability, random variables
Wednesday: Chapter two, conditional probability, Bayes formula, independence
Thursday: independent trials. birthday problem, conditional independence.

Week Two.
Monday, Chapter Three, probability distribution of a random variable, Cumulative distribution function
Tuesday: expectation and variance, Gaussian distribution,
Wednesday: Chapter four, normal approximation and law of large numbers for the binomial distribution, Applications of normal approximation,
Thursday: Poisson approximation, exponential.

Week Three:
Monday: Midterm Examination 30%.
Tuesday: Chapter five, Moment generating function, distribution of a function of a random variable
Wednesday: Chapter six, Joint distributions, Joint distributions and independence.
Thursday: Chapter seven, sums of independent random variables, exchangeability

Week Four:
Monday: Chapter eight, Expectations of sums and products, variance of sums.
Tuesday: Sums and moment generating functions, covariance and correlation.
Wednesday. Chapter nine, Markov's and Chebyshev's inequalities, law of large numbers,

Thursday. Central limit theorem

Week Five:
Monday, Chapter ten, Conditional Distributions
Tuesday, Conditional Distributions
Wednesday: Review
Thursday, **final, 60%**.