Master Program: Social and Economic Data Analysis (SEDA)
Subject Area: Econometrics and Applied Economics

Probability Theory and Statistical Inference

WS 2015/16

Syllabus

Instructor: Lyudmila Grigoryeva. lyudmila.grigoryeva@uni-konstanz.de. Room E 210. Phone: +49(0)7531/88-4333.

Office Hours: by appointment. Do not hesitate to e-mail me to set up an appointment.

Lecture times & locations: Th 8:15-9:45, G 307.

Tutorials times & locations: Fr 13:30-15:00, F 425.

Textbook: *Probability and Random Processes* by Geoffrey Grimmett and David Stirzaker (3rd ed.), *Statistical Inference* by George Casella and Roger L. Berger (2nd ed.). Note, however, that the lectures will not be based exclusively on one or another's text verbatim.

Prerequisites: Solid mastery of calculus, up to and including series, limits, partial differentiation, and multiple integration. Knowledge of these topics will be assumed and invoked freely. Students are referred to the first chapters of *Introduction to Topology and Modern Analysis* by George F. Simmons for mastering the necessary minimum.

Course Outline: The foundations of probability theory part of the course: (1) events, probability, conditional probability, independence, product spaces and completeness, discrete and continuous random variables; (2) expectation, conditional expectation and conditional distributions; (3) continuous random variables; (4) generating and continuous functions, their applications; (5) modes of convergence, two limit theorems. The statistical inference part of the course: (6) properties of a random sample; (7) principles of data reduction, the sufficiency and the likelihood principles; (8) point estimation, finding and evaluating estimators; (9) hypothesis testing; (10) interval estimation, finding and evaluating interval estimators; (11) regression models.

Grade Policy: Tutorial assignments, 30%; 1 midterm take-home, 15%; attendance, active participation, surprise quizzes, 15%, final exam, 40%. Everyone will be graded following this scheme. To receive the honors credit, you should have to perform well in all the listed categories.

Supplementary Material: *Introduction to Probability* by Charles Grinstead and J. Laurie Snell (2nd ed.), *Probability Essentials* by Jean Jacod and Philip Protter. All the tutorial materials and the syllabus will be accessible on my webpage: http://www.grigoryeva.info/teaching.

Tutorials' Preparations: Each tutorial problem set will be provided approximately one week in advance (except the first week), so that students can prepare themselves for the tutorials class by

completing the assignments. During the tutorials session volunteers present their solutions on the blackboard. Every student has to be at the blackboard at least n times with n to be announced after the first two weeks.

Homework: Some of the details omitted in the lecture material may be asked to be completed as homework and checked during the following tutorial at random. The absence of the executed tasks will have a negative effect on the tutorial grades.

Academic Honesty: Students are responsible for executing the assignments individually. Copying is not allowed.

Attendance Policy: Students are expected to attend classes regularly, both lecture and tutorials sessions. Special cases: (a) if the student knows in advance that he/she is going to miss the tutorial session at date i, then he/she is supposed to hand in the due assignment for that session the latest on the date $i-1$ (a paper pocket will be hanging on my office door); otherwise the assignment will be considered as not completed; (b) if the student misses the tutorials session on the date i due to unexpected serious reasons, then he/she is supposed to hand in the assignments for the missed session on the date $i+3$ the latest (using the pocket on my office door); otherwise the assignment will be considered as not completed.

Important Dates:

Mid-Term Take-Home ..... To be announced
Course Final ..... To be announced