

MFE Statistics

Syllabus – Winter 2017

(Subject to change – version 8/11/16)

Instructor: Professor Martin Lettau

GSI: TBA

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Class homepage: bCourses and Study.Net

Class time and location: Wed 6:00 - 9:00

Course Description

This course will cover the fundamentals of theoretical and applied probability and statistics. The goal of the class is to give students the required tools and concepts to analyze and understand financial data.

I will use Python during the lecture and for problem sets. You may use any matrix-based programming language to answer problem set question (software with “canned” routines, such as Stata, Eviews or Excel, are not allowed!) but I strongly recommend that you learn Python (required in the Haas MFE program).

Prerequisites

- Linear algebra
- Matrix algebra
- Calculus

The MFE pre-program mathematics class covers some of these topics. These concepts will not be reviewed in this class and I may refer to the math class material.

Grading

Students who complete the assignments satisfactorily and on time will receive a certificate that they have passed the course. Students may miss one assignment. Students who miss more than one assignment will not receive a certificate.

Problem Sets

There will be weekly mandatory assignments submitted electronically via bCourses. Students are allowed to consult all the material provided in the course (lecture notes, books, etc.), as well as resources available on the internet, but are not allowed to use any material that - even remotely - resembles a “solution” to the assignment. If there is any doubt, please contact the instructor. Also, students are allowed to discuss the material and assignments, e.g. in the bCourses chat room. However, providing actual code, detailed descriptions of solutions, etc., is strictly prohibited.

Late submissions will not be accepted. No exceptions!

Ethics and Etiquette

We ask students to refrain from behavior that has been demonstrated to interfere with a positive classroom experience. This especially includes holding any type of side conversation (voice, electronic, etc.), using laptops to surf the Web, check e-mail, arriving late to class, etc.

Honor Code

All students agree to abide by the Berkeley Campus Code of Student Conduct, <http://students.berkeley.edu/uga/cs/general/policy.htm>, and by the terms of the the supplemental MFE Code of Student Conduct.

Lecture Notes and other Course Material

Lecture notes will be available prior to class on Study.Net. All additional reading material will be announced before class and will also be available on bCourses or Study.Net.

Required Textbooks

- DeGroot and Schervish (DGS): *Probability and Statistics*, 4th edition, 2012
- Shumway and Stoffer (SS): *Time Series Analysis and Its Applications, EZ Edition*, pdf available free at <http://www.stat.pitt.edu/stoffer/tsa4/tsaEZ.pdf>

Class overview

1. Probability (DGS chs. 1, 2): Definitions, independence, Bayes' theorem
2. Random variables (DGS chs. 3): Univariate and multivariate distributions, marginal and conditional distributions, important distributions
3. Moments (DGS ch. 4): Expectations, variance, moment generating function
4. Convergence of random variables (DGS ch. 6): Law of large numbers, central limit theorem
5. Estimation (DGS ch. 7): Maximum likelihood, method of moments
6. Sampling distributions of estimators (DGS ch. 8): χ^2 , t , F distributions, limiting distributions, confidence intervals
7. Hypothesis testing (DGS ch. 9): Simple tests, power vs. size
8. Conditional expectation functions and projections (lecture notes): Conditional expectation functions, conditional variance, best linear predictor
9. Linear statistical model (DGS ch. 11): OLS regression, small sample distribution, Gauss-Markov theorem, ANOVA
10. Introduction to linear time series (SS ch. 1 and 3): Autocorrelation and partial autocorrelation functions, dependence, stationarity, AR models