

UNIVERSITY OF COLORADO - DEPARTMENT OF ECONOMICS - FALL 2018  
ECON 4858 FINANCIAL ECONOMETRICS  
PROFESSOR CARLOS BRUNET MARTINS-FILHO

**Office.** Economics Building 105.

**Meetings.** Tuesdays and Thursdays 12:30 PM - 1:45 PM at University Club 4.

**Office hours.** Tuesdays 4:00 PM - 5:30 PM or by appointment. For appointment send an email to [carlos.martins@colorado.edu](mailto:carlos.martins@colorado.edu).

**Prerequisites.** Successful completion of ECON 3818 or equivalent is a required prerequisite. Completion of ECON 4818 is desirable, but not necessary.

**Objectives.** Introduce statistical models, estimation and testing procedures used in analyzing financial data.

**Class URL.** <http://spot.colorado.edu/~martinsc/4858.html>.

**Grades.** Grades (A-F) will be based on the following:

- There will be four sets of homework questions whose answers will be graded. Each set accounts for 10 percent of your course grade. Some of these questions will involve the use of MATLAB, a software that is freely available on campus.
- There will be one midterm examination. It accounts for 30 percent of your course grade.
- There will be a final examination. It accounts for 30 percent of your course grade.

Dates for the examinations:

Examination	Date and Time
Midterm	October 16, University Club 4
Final Examination	December 19, 4:30 PM - 7:00 PM, University Club 4

Homework sets will be available on the class web site with their respective due dates.

**Textbook.**

1. Ruppert, D., 2004, Statistics and Finance: An Introduction. Springer, New York.

**Additional.**

1. Bernstein, P., 2005, Capital Ideas: The Improbable Origins of Modern Wall Street. John Wiley and Sons, New York.

This book gives an informal and historical account of the development of many of the models we treat in class. Great reading for all students in this course.

2. Lai, T. L., and Peng, H., 2008, Statistical Models and Methods for Financial Markets. Springer, New York.

3. Ruppert, D., 2011, Statistics and Data Analysis for Financial Engineering. Springer, New York.

This book contains much of the material in our textbook. In many instances, however, the treatment is more advanced.

4. Tsay, R. S., 2010, Analysis of Financial Time Series. John Wiley & Sons, Hoboken, New Jersey.

This is an advanced textbook, normally used in graduate courses. Its study is recommended for those that have taken more advanced courses in probability, statistics and econometrics and are looking for a deeper understanding of what we discuss in class.

5. Hanselman, D. and Littlefield, B., 2005, Mastering MATLAB 7. Pearson, Upper Saddle River, New Jersey.

This is one of many step-by-step manuals/guide to MATLAB that are commercially available. It is very easy to read and provides speedy access to the many resources this software offers.

6. Frain, J. C., 2014, MATLAB for Economics and Econometrics: A Beginners Guide. Trinity College Economics Papers - Working Paper 0414.

This is another step-by-step introduction to MATLAB with a focus on the Econometrics Toolbox.

## Topics.

All readings are from the textbook and class notes.

1. Introduction and Basic Concepts for Probability and Statistical Models

- Random variables

- Distribution functions, Cumulative distribution functions

- Quantiles, moments, order statistics

- Skewness, kurtosis and heavy tail distributions

- Multivariate distributions, marginals and conditional distributions

- Prediction Estimation - maximum likelihood, least squares

- Hypothesis testing and confidence intervals

2. Returns

- The random walk model

- The efficient market hypothesis

3. Regression

- Least squares estimation

- Regression and best linear prediction

- Non-normality and data transformations

4. Time Series Models

- Stationarity

- Autoregressive AR(p) models and estimation

- Moving average models MA(q) and estimation ARMA/ARIMA models

- Model selection: Akaike's information criterion (AIC) and Bayesian information criterion (BIC)

- Forecasting

- ARCH and GARCH models

5. Portfolio theory

- Trading off expected return and risk

6. The capital asset pricing model
  - Capital market line, security market line
  - Security characteristic line
  - Using CAPM in portfolio analysis
  - Factor models
7. Fixed income securities
  - Zero-coupon bonds, coupon bonds
  - Yield to maturity
  - Term structure
  - Continuous compounding
  - Continuous forward rates
  - Sensitivity of price to yield
8. Value-at-Risk
  - One asset
  - Portfolio
9. Options pricing
  - Call options
  - The law of one price
  - Pricing calls
  - Martingales
  - The Black-Scholes model, formula and its use
  - Puts
  - Evolution of option prices
  - Leverage of options and hedging

**Important information.**

- If you qualify for accommodations because of a disability, please submit a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu).  
If you have a temporary medical condition or injury, see Temporary Medical Conditions: Injuries, Surgeries, and Illnesses guidelines under Quick Links at Disability Services website and discuss your needs with me.
- Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, if the midterm, final or homework due dates prevent/inhibit you from exercising your rights to religious observance, please inform me by August 29, so that reasonable accommodations can be made. See full details at [www.colorado.edu/policies/fac\\_relig.html](http://www.colorado.edu/policies/fac_relig.html).

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