Meetings. Class meetings will be held remotely, via Zoom, Tuesdays and Thursdays 12:45 PM - 2:00 PM. You will receive an email with a Zoom meeting invitation for each class meeting. All of our meetings will be recorded. You should have your **video turned on** and your **audio turned off**, except, of course, when you want to ask a question or when you respond to a question I have asked.

Office hours. Office hours will be held remotely, via Zoom, Tuesdays and Thursdays from 4:00 PM - 5:30 PM. You will receive an email with a Zoom meeting invitation to join me for office hours. Office hours will not be recorded. If you need an appointment outside these hours send an email to carlos.martins@colorado.edu and I will try to accommodate your request.

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. This course has a Canvas page where you will find this syllabus, class slides, class notes, homework assignments and recordings of every class meeting. Consult the Canvas page regularly.

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

- There will be five sets of homework questions that will not be graded. However, you must turn in your answers at the specified due date. I will provide answers for these questions. Failing to submit answers for a homework set will result in a 10 percent reduction on your **course** grade.

- There will be two midterm examinations. Each accounts for 30 percent of your course grade.

- There will be a final examination. It accounts for 40 percent of your course grade.

Dates for the examinations:

Examination	Date and Time
Midterm 1	October 1
Midterm 2	November 5
Final Examination	December 12, 4:30 PM - 7:00 PM

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 topics covered depend on some fundamental statistical concepts and results from Chapter 2 of your textbook and Econ 3818. As such, throughout the course, we will be repeatedly using the concepts and results from Chapter 2.

1. Returns

   Gross returns, Net returns and log returns

   The efficient market hypothesis

2. The random walk model

3. Maximum likelihood and method of moments estimation

4. Time Series Models

   Stationarity

   Autoregressive AR(p) models and estimation

   Moving average models MA(q) and estimation ARMA models

   GARCH models and estimation

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

5. Regression

   Least squares estimation

   Regression and best linear prediction

   Non-normality and data transformations

6. Portfolio Theory

   Trading off expected return and risk

7. The Capital Asset Pricing Model

   Capital market line, security market line

   Security characteristic line

   Using CAPM in portfolio analysis

   Factor models

8. Fixed income securities

   Zero-coupon bonds, coupon bonds

   Yield to maturity

   Term structure

   Continuous compounding

   Continuous forward rates

   Sensitivity of price to yield

9. Value-at-Risk

Important information.

- Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See polices at www.colorado.edu/policies/classbehavior.html. and at www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code.

- As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements, and public health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

  - maintain 6-foot distancing when possible,
  - wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,
  - clean local work area,
  - practice hand hygiene,
  - follow public health orders, and
  - if sick and you live off campus, do not come onto campus (unless instructed by a CU Healthcare professional), or if you live on-campus, please alert CU Boulder Medical Services.

  Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policies on COVID-19 Health and Safety and classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please see the ?Accommodation for Disabilities? statement on this syllabus. Before returning to campus, all students must complete the COVID-19 Student Health and Expectations Course. Before coming on to campus each day, all

students are required to complete a Daily Health Form. Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home and complete the Health Questionnaire and Illness Reporting Form remotely. In this class, if you are sick or quarantined, please inform me via email.

- 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.

  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.

- The University of Colorado at Boulder is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). The University of Colorado at Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this The University of Colorado at Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, or veteran status. Individuals who believe they have been discriminated against should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 303-492-5550. Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://hr.colorado.edu/dh/

- All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at www.colorado.edu/policies/honor.html and at http://honorcode.colorado.edu.