

# Econ 525: Advanced Financial Economics

UNC at Chapel Hill, Department of Economics

Spring 2018



## Instructor

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Office Hours: T,R 2pm-3pm

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TBD

TBD

## Class Schedule:

T,R 03:30pm-04:45pm Gardner Hall Rm 209

## Communication:

Assignments, announcements, grades, readings, and other information will be posted on sakai. The sakai site will be the primary method of communication for this course, so please check it frequently.

## Prerequisites:

Econ 425 (Financial Economics)

Econ 493 must be taken concurrently with Econ 525

Econ 410 (Intermediate Theory: Price and Distribution) with a grade of C or better

Econ 400 (Economic Statistics) with a grade of C or better

This course is open only to students who complete and are vetted via the QFE application process. More information can be found at [qfe.web.unc.edu](http://qfe.web.unc.edu).

## Course Description:

Building upon the foundation developed in Econ 425, students take part in each of the five steps of the asset allocation process: 1) (Explore) How does the modern financial economist acquire, clean and transform data? 2) (Explain) What drives asset returns? 3) (Predict) Can we forecast returns? 4) (Allocate) How do we form a portfolio in the presence of risk? 5) (Protect) How do we assess and manage risk?

Course Materials:

**Recommended Texts:** *Quantitative Financial Economics* by Keith Cuthbertson (Wiley 1996); *The Econometrics of Financial Markets* by Campbell, Lo, and MacKinaly (Princeton University Press 1997)

**Recommended Periodicals:** Keeping abreast of the financial and macro news is essential for this course. Although not officially required, reading the *The Wall Street Journal* and/or the *Economist* is highly recommended.

**Code of Conduct:** The University Honor Code is in effect. In particular, this implies that all work submitted is your own. Moreover, I expect professional behavior at all times. For example, the non-academic use of personal electronic devices is prohibited.

**Software:** We will be using Matlab extensively in this course. A prior familiarity with this program is helpful, but not required to succeed in Econ 493/525. There are several excellent primers available: *Financial Modeling: Theory, Implementation, and Practice with Matlab Source* by Kienitz and Wetterau (Wiley 2013), *Beginners Guide to Matlab for Economics and Econometrics* by Frain (2014), as well as several tutorial videos from Mathworks (creators of Matlab) <https://www.mathworks.com/videos/introduction-to-matlab-81592.html>. Also, remember that there are resources available to you from the Matlab bootcamp held in the previous fall semester. We will be using version R2016b and higher during the course, but older versions should suffice. However, keep in mind that if you are using an older version of Matlab you may not be able to utilize all of the same functions that will be seen in examples. Each Matlab version update usually involves retiring some functions and introducing new functions. In addition to the standard toolboxes, we will be using the DataFeed, DataBase, Econometrics, Financial, and Financial Instruments toolboxes. As a UNC student you can access Matlab via UNC's Virtual Lab: <https://virtuallab.unc.edu>, or obtain a free copy via UNC's Software Acquisition portal <https://sa.unc.edu/shop/home>. Note that at the time of writing this document, these two options do not have all of required toolboxes. You can purchase additional toolboxes and/or a base copy of Mathworks by visiting <https://www.mathworks.com/store>, click "Buy Now" in the Student box, and choose "Matlab Student" along with the aforementioned toolboxes. Note that there are dependencies, which might require the purchase of additional toolboxes for full functionality.

Grading Policy: Letter grades are computed from the total points earned during the semester and assigned based on the scale nearby. There is no maximum number of A's nor B's awarded. However, in previous courses 15% – 20% of my students have earned in the A range, 30% – 50% have earned in the B range, and 20% – 30% have earned in the C range. Although the grade distribution may change this semester, the past scores should give you a sense of my grading standards.

A	$x \geq 95\%$
A-	$90 \leq x < 95$
B+	$85 \leq x < 90$
B	$80 \leq x < 85$
B-	$75 \leq x < 80$
C+	$70 \leq x < 75$
C	$65 \leq x < 70$
C-	$60 \leq x < 65$
D+	$50 \leq x < 60$
D	$40 \leq x < 50$
F	$x < 40$

Grading	% of Course Grade	Date	Details & Policy
Term Paper	(30%)	05/01/18	Each student is responsible for producing an original paper that illustrates the skills developed in this course. The paper should build on the current academic literature, having both theoretical and empirical components. These papers may be written in conjunction with one of the QFE corporate “partners”. Topics are subject to instructor approval. A preliminary proposal is due on TBD. More details below.
Homework	(30%)	TBD	There are approximately 10 homework assignments throughout the semester. No late assignment will be accepted.
Lecture Leader	(30%)	TBD	Students will be broken out into teams of approximately five classmates. Each team will be responsible to lead the class discussion on two separate occasions during the semester, submitting their slides and other preparatory materials for assessment. Team members’ individual contributions will be subject to peer review. More details below.
Research Peer Review	(5%)	03/23/18	Each student is paired with a classmate to provide “peer review“ support during the research process associated with the course paper. A written assessment of the paper under review is required on the date indicated. More details below.
Teaching Peer Review	(5%)	TBD	Each student must submit a brief summary of the student led lectures.

Students associated with Disability Services must contact me one week prior to each Test.

Excused Absences: Illness or participation in University sanctioned activities. Documentation from coach or doctor must be provided. You must fill out the “Excused Absence” form found on the course site, and turn it in to me as soon as possible.

## The QFE Credential

The goal of the Credential in Quantitative Financial Economics (QFE) is to train students as financial economists, providing all the quantitative tools necessary to bring theory into practice. The Credential is graciously sponsored by, and implemented in conjunction with, the NASDAQ Foundation.

Financial Economics is a subfield of economics wherein money is on both sides of a trade between parties. The trade typically exchanges money now for money at some point in the future, and is subject to uncertainty. There are traditionally two branches of Financial Economics: Asset Pricing (e.g. macro investment analysis) and Corporate Finance (e.g. capital budgeting decisions). The QFE provides the foundation for both branches, but the focus is on the former.

The modern financial economist is deluged with data. Financial market transactions are available across myriad asset classes and recorded at high frequencies. Rigorous quantitative analysis is required to separate the signal from the noise. The QFE will reinforce the statistical and econometric skills of our current undergraduate curriculum, and introduce the students to an array of computational tools.

### **Econ 423 Financial Economics (3 credits; Fall and Spring)**

A central theme underlies the course: How does a risk averse individual allocate their funds? Students begin by defining and measuring risk, making connections to their microeconomics training. They then develop and use asset pricing models to explore the interplay between risk and return. These pricing tools are then applied to several assets, including equities, fixed income, and foreign exchange. Finally, students use these tools to develop a mean-variance optimal portfolio allocation. Along the way, students are introduced to basic quantitative tools, and participate in myriad practical applications.

### **Econ 493 Practicum in Quantitative Financial Economics (1 credit; Spring)**

Working in conjunction with Econ 590, this practicum provides students the opportunity to implement and test the models being developed in Econ 423. Students will work with multiple data sources and programming platforms, and engage in a series of practical experiments using live market information. *Pre-Requisite: Econ 423; Note: Econ 490 must be taken concurrently with Econ 590.*

### **Econ 525 Advanced Financial Economics (3 credits; Spring)**

Building upon the foundation developed in Econ 425, students take part in each of the five steps of the asset allocation process: 1) (Explore) How does the modern financial economist acquire, clean and transform data? 2) (Explain) What drives asset returns? 3) (Predict) Can we forecast returns? 4) (Allocate) How do we form a portfolio in the presence of risk? 5) (Protect) How do we assess and manage risk? *Pre-Requisite: Econ 423*

## Tentative Course Outline

### Section 1 - Explore

Week 1: [Course Introduction; Acquiring financial data] “Matlab for Economics and Econometrics: A Beginners Guide” by Frain (2014)

Week 2: [Microstructure Data; TAQ; SQL] “Lifecycle of a Security” by Morris and Goldstein (2010); “Econometrics of Financial Markets” by Campbell, Lo, and MacKinlay (1997), Ch3

### Section 2 - Explain

Week 3: [Connecting the Markets and the Macroeconomy] “Macroeconomics” by Mankiw (2010) Ch14; “Bridging the Classroom Gap Between Asset Pricing and Business Cycle Theory” by Aguilar and Soques (2015)

Week 4-5: [Factor Models; Fama-MacBeth] “Economic Forces and the Stock Market” by Chen, Ross, and Roll (1986); “Quantitative Financial Economics” by Cuthbertson (2004) Ch3; “Econometrics of Financial Markets” by Campbell, Lo, and MacKinlay (1997), Ch6; “Common Risk Factors in the Returns of Stocks and Bonds” by Fama and French (1993)

Week 6: [Sequential and Simultaneous Screening Models] “Quantitative Equity Portfolio Management” by Chincarini and Kim (2006) Ch5

### Section 3 - Predict

Week 7: [Efficient Market Hypothesis; Event Study; Variance Ratio] “Econometrics of Financial Markets” by Campbell, Lo, and MacKinlay (1997), Ch2&4; “Quantitative Financial Economics” by Cuthbertson (2004) Ch5-8

Week 8: [Time Series Modeling; ARMA; GARCH; Seasonality] “Econometrics of Financial Markets” by Campbell, Lo, and MacKinlay (1997), Ch12

Week 9: [Pairs Trading via Cointegration; Mixed Frequency via MIDAS] “There is a Risk Return Trade-off After All” by Ghysels, Santa-Clara, and Valkanov (2005); “Pairs Trading: Quantitative Methods and Analysis” by Vidyamurthy (2004) Ch5-7

Week 10: Spring Break

Week 11: [Yield Curve Modeling] “Forecasting the Term Structure of Government Bond Yields” by Diebold and Li (2006);

### Step 4 - Allocate

Week 12: [Advanced Portfolio Optimization; TCA; Black Litterman] “The Black Litterman Model in Detail” by Walter (2007); “Global Portfolio Optimization” by Black and Litterman (1992); Term paper peer reviews are due

## Step 5 - Protect

Week 13: [Portfolio Risk Attribution; Value at Risk; Factor Exposure Targeting] “An Overview of Value at Risk”, by Duffie and Pan (1997); “Quantitative Equity Portfolio Management” by Chincarini and Kim (2006) Ch15.5, Ch9.7, Ch9.8

Week 14: [Options and Futures] “Options, Futures, and other Derivatives” by Hull (2009) Ch1-3, Ch8-13

## Term Papers

- Week 15: One-on-One research meetings with Professor
- Week 16: One-on-One research meetings with Professor
- Week 17: Submit term paper

## Term Paper

As an experiential education course, each student will apply empirical tools to the “real world” by conducting their own research into the functioning of the financial markets.

- Each student is responsible for two deliverables: i) a research proposal, and ii) the term paper.
- Early in the semester, students are matched (to the extent possible) with QFE Professional Research Partners (PRPs) based upon mutual interests. The PRP’s are practitioners in the field of finance, whose role is to serve as subject matter experts for the student’s research. The student and PRP meet once near the beginning of the semester to discuss potential research topics.
- The research topic should build strongly upon a precedent in the literature, but needs to have some degree of originality. For example, simply replicating a published article is not sufficient. However, applying an established technique to a new asset class, or extending an analysis to a potentially different structural environment are acceptable. All topics are subject to instructor approval.
- The research proposal is due within the first month of semester (see course calendar for specific dates). The proposal must be 2-4 pages in length. It should consist of a working title, motivation, the specific question you are asking, prior literature, data, and proposed methodology. Be sure to highlight your contribution to the literature. This proposal will not be graded, but is REQUIRED. Failure to submit a well structured proposal by the specified date will result in a loss of 10 percentage points from the term paper grade.
- Each student meets with the instructor on a bi-weekly basis to develop and execute a rigorous research agenda. Moreover, the students meet with their PRPs on (at least) a monthly basis for the balance of the semester, culminating with a final presentation of findings to the instructor and PRP.
- The term paper is due during the final exam period (see course calendar for specific dates). The paper should be approximately 20 pages in length, including a reasonable number of tables and figures.
- The term paper should be submitted as a pdf, and must be accompanied by zip file that contains all requisite data and code used to conduct your analysis. Just as in the CodeBook, this code should be well commented and structured. This code must be “runnable”. If you have more than one m-file or data file, please include a text file titled “ReadMe.txt” which explains what each file does and the order in which it should be run.
- Students should submit all documents associated with the assignment via the Sakai dropbox by the due date and time indicated on the course calendar. Label each file with the following convention: “LastNameFirstName\_*TermPaper*”. For example, “AguilarMichael\_*TermPaper*.pdf” and “AguilarMichael\_*TermPaper*.m” would be acceptable submissions.
- The paper is NOT graded by whether or not a purported hypothesis is true. Rather, we are looking for proper research methods. Specifically, 15% of the term paper grade will be determined by the structure and proper commenting of the associated code. The remaining 85% will be determined by each student’s written paper. In the following you can find the essential elements of a good term paper and the associated allocation of the 85% score

Introduction - 2%

Motivation and prior literature - 4.5%  
Methodology - 25.5%  
Data Description - 25.5%  
Findings - 25.5%  
Conclusion and possible extensions - 2%

## Research Peer Review

Each student will have the opportunity to review and critique a draft of a classmate's term paper.

- Each student will be assigned to a classmate, whose research he/she must review carefully and critique. The fodder for this review is the Research Proposal, which is submitted near the beginning of the semester and is designed to provide a general overview of the intended research. By providing a Research Peer Review, the student can assist with enhancing the quality of their classmate's Term Paper.
- This Research Peer Review must be 2-4 pages in length, and should provide a brief summary of i) the motivation and research question, ii) prior literature, iii) data, and iv) proposed methodology.
- In addition to this summary, the Research Peer Review should be a thoughtful critique of your classmate's work. Each student should address questions such as, but not limited to, i) Is the motivation sufficiently interesting, ii) Does the proposal make a useful contribution to the literature?, iii) Is the data cited easily accessible?, iv) Does the proposed methodology make sense?, v) Will the proposed methodology address the question posed by the author?, etc...
- The Research Peer Review should be submitted as a pdf.
- Submit all documents associated with the assignment via the Sakai dropbox by the due date and time indicated on the course calendar. Label each file with the following convention: "LastNameFirstName\_PeerReviewOf\_LastNameFirstName". For example, "AguilarMichael\_PeerReviewOf\_AsisGonzalo.pdf" is an acceptable submission for Michael Aguilar's Research Peer Review of Gonzalo Asis's Research Proposal.

## Lecture Leader

Small groups of students will lead the classroom discussion for specific topics throughout the semester.

- Each group will consist of approximately 5 students. Each group will be responsible for guiding two lectures throughout the semester. Lecture topics and dates are indicated on the course calendar.
- Each student will receive the group's score for this assignment, subject to a peer review. Specifically, at the end of the semester each student will have the opportunity to assess the participation of their groupmates. If a teammate engaged fully in the activity, then the student completing the peer review should award 100% for that teammate, earning that teammate the entirety of the group's score. If a student was completely negligent of his/her responsibilities, then the student completing the peer review should award 0% for that teammate, thereby setting that teammate's score to 0% for this assignment.
- On the assigned date, the specified group is responsible for leading all aspects of the lecture. This includes developing all presentation materials, delivering those materials to the class, and fielding questions from the audience.
- The group will receive guidance from the instructor in advance of their presentation as to the breadth and depth of the material they are expected to cover.
- Delivery of your lesson can be done in any medium you see fit: written notes on the board, powerpoint, etc. . . These notes must be submitted to the instructor for evaluation, and will be made available to your classmates as a learning tool. Be sure to cite any reference materials used to create your lesson plans. Include full citations, including page numbers. Be prepared to address questions from students and instructors.
- Groups should use a lecture format when presenting their lesson (i.e. the Student Leaders are at the front of the room delivering the presentation of the material). Groups may supplement this pedagogical style with interactive question-and-answer sessions from the audience. (i.e. Ask the class a question, and solicit responses). However, groups are not to utilize other active learning techniques, such as break out sessions wherein the students work on problems in small groups. Moreover, groups are not to utilize computer code during your lecture (e.g. show the students how to implement your topic in practice). These non-lecture pedagogical techniques will be used by the faculty instructor during subsequent lessons.

## Teaching Peer Review

Each student will have the opportunity to summarize and evaluate the lessons provide by their classmates under the “Lecture Leader” series.

- Students NOT leading the class (i.e. audience members) must complete a brief summary of the content presented, as well as provide a quick evaluation of the Lecture Leaders.
- The rubric for the evaluation will be posted on sakai.
- Submissions should be made via the sakai dropbox within 24hours of the end of each Lecture Leader class.
- The file for submission should be a pdf with the following naming convention: “TPR\_LastName\_FirstName\_Date.pdf”. For example, if Mike Aguilar was creating his review for the lesson that ended on 12/14/18 @5pm, he would submit “TPR\_Aguilar\_Mike\_14Dec2018.pdf” by no later than 12/15/18 @5pm.