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**School of Business  
Masters in International Management 2015/2016**

**MODULE CODE: BU7510**  
**MODULE NAME: Financial Econometrics**  
**ECTS: This course carries 5 ECTS credits.**

**Lecturer:** Gerald P. Dwyer  
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**Office Hours:** By appointment during the class week

**MODULE DESCRIPTION**

The purpose of the course is to help you learn relatively advanced econometric techniques to analyse data and how to use those techniques to reliably extract information from data. The course explores characteristics of time series and how to examine summary statistics to discern patterns that are informative. The course will focus on linear and nonlinear time series analysis, including substantial analysis of volatility estimation.

**LEARNING AND TEACHING APPROACH**

The most apparent aspect of this course is the set of lectures. You will not learn the material by merely attending the lectures. Reading the textbook and studying after the lectures, while very important, also are not be sufficient to learn the material. The class assignment and the paper are extremely important parts of learning the material because they require you to think about the numbers spewed out of a computer and how to interpret them.

The course assumes that you are familiar with basic statistics and econometrics. This is **not** a suitable first course in statistics. Taking the Data Analysis course in this program is excellent preparation for this course but is not required. Your background knowledge should be enough that you are broadly familiar with the material on linear regression in Chapters 3 and 4 in Brooks, material which will be covered only briefly in class.

Each day will consist of lectures combined with some analysis of data before the next class. The slides for last year's class are available at <http://www.jerrydwyer.com/courses/>. The slides for this year will be different in various ways and will be available before each class on the School of Business Intranet website.

The topics listed are the ones I intend to cover. For this course, you need not concern yourself with mathematical analysis to prove statements or computer programming to obtain estimates. Rather, the goal is to learn statistical and econometric tools and be able to use them to analyse financial markets and, to a lesser degree, to forecast the future. The lecture notes are good guides to what is most important. There is not enough class time to talk about less important things.

## **LEARNING OUTCOMES**

Having successfully completed this module, you should be able to:

- Explain the importance of examining your data before applying some fancy econometric technique and be able to do such an analysis.
- Do basic estimation of factor models used for portfolio management.
- Use basic time series analysis, including applying these techniques to messy data for analysis and forecasting.
- Use linear time series analysis to extract patterns in the data.
- Use volatility models to characterize data. This includes the ability to reliably estimate such models and tell the difference between reasonable inferences and not so sensible inferences.
- Be able to estimate relationships between variables that are reliable with solid statistical foundations.
- Explain the basics of Value at Risk, including its uses and pitfalls.

## **RELATION TO DEGREE**

This course is especially strong support for the following degree-level learning outcomes:

1. Identify, critically evaluate and synthesise the substantive theories, frameworks and models, both quantitative and qualitative that are used in modern financial analysis.
2. Select and justify approaches to identifying, analysing and solving a variety of financial and finance related problems at corporate, business and functional levels and to relate these to the macro economic and political environment.
3. Make effective use of modern technological systems when solving financial and finance related problems in corporate, business and functional settings.
4. Add to the body of knowledge in the fields of business and financial management.
5. Communicate effectively in oral and written modes in professional and academic settings.
6. Demonstrate the capacity and to engage in life-long learning.

### **CFA Candidate Body of Knowledge:**

The material covered in this course is related to the Quantitative Methods of the CFA Candidate Body of Knowledge. De Fusco et al., (2007) *Quantitative Investment Analysis* has been used for CFA Level I, II and III examinations. This course covers partly overlapping material, although the content goes well beyond that book and is intended to provide knowledge enough to work as a quantitative analyst given financial training.

## WORKLOAD

| <b>Content</b>   | <b>Indicative Number of Hours</b> |
|--|-----------------------------------|
| <i>Lecturing hours</i>   | 25                                |
| <i>Preparation for lectures</i>  | 6                                 |
| <i>Individual assignment</i>   | 50                                |
| <i>Group assignment</i>  | N/A                               |
| <i>Reading of assigned materials and active reflection on lecture and course content and linkage to personal experiences</i> | 25                                |
| <i>Final exam preparation</i>  | 20                                |
| <b>Total</b>   | <b>125</b>                        |

## TEXTBOOKS AND REQUIRED RESOURCES

### Required core course textbook:

Brooks, Chris. *Introductory Econometrics for Finance*, 3<sup>rd</sup> Edition. Cambridge University Press, 2014.

This edition is not fundamentally different than the 2<sup>nd</sup> edition which still is available, but the 3<sup>rd</sup> edition has updated screen shots and instruction for a more recent version of EViews instead of an earlier version. It also organized slightly differently with an additional chapter at the start of the text.

Empirical analysis of data will be a very important part of the course. You will have to have access to a time-series econometrics program. I will use EViews in class.

If you are comfortable with some software program, familiar with it and the program can do estimation discussed in class, use that program. If not, I suggest EViews. The student version of EViews is cheap relative to other such programs. EViews includes the statistical techniques covered in this class, is menu driven, and is relatively simple to learn and use. I will use EViews in class because the interactive menus in EViews are perfect for presentations. Also, it is used in the book and in the website related to the book at

<http://www.cambridge.org/gb/academic/textbooks/introductory-econometrics>. R, MATLAB and SAS are other programs commonly used by financial professionals.

If you have a background in programming, R is an excellent language and environment for statistical work. The program is open source, which means there is no charge to use it, and it is extremely capable. It is a command-line program though and requires a fairly high level of comfort with computers and programming. You can read about it <http://www.r-project.org/about.html>.

### General Supplemental Readings

Additional required and suggested readings may be assigned from readily available sources. They will be posted on the course website.

These supplementary reading will include

“When You Fall in Love, This Is What Facebook Sees”

Kennedy, chapter on “The Bayesian Approach”

Campbell, Lo and MacKinlay, “Event-Study Analysis”, Chapter 4 in *The Econometrics of Financial Markets*,

Kothari, S.P. and Jerold B. Warner, “Econometrics of Event Studies”, Chapter 1 in *Handbook of Corporate Finance*.

“Nonlinear Time Series and Financial Applications, Gerald P. Dwyer, 2014

“A Gentle Introduction to the RiskMetrics 2006 Methodology” by Gilles Zumbach

“The RiskMetrics 2006 Methodology” by Gilles Zumbach\*

Finger, Christopher C. “Doomed to repeat it?” Research Monthly, RiskMetrics Group. November 2008

Dowd, Kevin. “Math Gone Mad”, Policy Analysis, Cato Institute, 2014.

### **Student preparation for the module**

You should work through the first four chapters of the textbook by Brooks before the module begins. You should find little material new to you in the third and fourth chapters if your background is adequate for this class, but it will remind you of things you may have forgotten.

You should acquire a software program, whether EViews or a similar program, which estimates time-series econometric models discussed in class. Phrases to look for include regression, Box-Jenkins, ARCH, unit roots, cointegration, vector autoregressions, and error correction mechanisms.

You also should acquire, by downloading or otherwise, two time series – data over time – with at least about 100 observations. You will find it helpful to have these data during the week of lectures. They need to be over a similar time period at a similar frequency (daily, monthly, or other) but they need not be related by any financial or other theory.

### **COURSE COMMUNICATION**

E-mail works best since I reside in the United States.

### **ASSESSMENT**

Assessment will be based on analysis of a couple of data series chosen by you using techniques in class (10%), an individual project in which you analyse data and draw inferences (40%) and an examination after the course (50%).

The short assignment will require you to apply the time-series techniques discussed in class to two data series of your choice.

The paper requires you to select a topic that can be examined using techniques discussed in class and write a paper doing that analysis. I am happy to discuss topics when you are trying to decide on one. The paper will be submitted through Turnitin.

Students who fail a module will need to sit a repeat examination. The final mark will include the weighted assignment and repeat examination marks. The grade that a student can achieve in a repeat examination is capped - the overall average of all their taught modules will be the highest grade students can be awarded for a module in which they sit repeat examinations.

**Exam Date:** TBA

**Exam venue:** TBA

**Deadline for Project Submissions:** The simple analysis using the techniques learned in class is due Monday, February 15, a bit over two weeks after class ends. The larger individual project is due Monday, April 4.

**Late Submission Policy:** Students unable to submit an assignment on time for medical reasons must produce a medical certificate to the lecturer within three working days of the missed submission deadline. Assignments submitted after the indicated deadline otherwise will not be accepted.

## MODULE SCHEDULE

Lectures take place on the dates and at the places specified below. Changes will be communicated in class and posted as early as feasible on the course intranet site. Material to be covered each day is indicative and not exact. Readings in the below schedule are from the third edition. You can determine readings in the second edition from lecture and chapter titles.

| <b>Hilary Term</b> |  |  |
|--------------------|--|--|
| <b>Session</b>     | <b>Date with Venue to be announced</b> | <b>Lecture &amp; readings based on 3<sup>rd</sup> edition of Brooks</b>  |
| 1                  | January 25                             | Estimation: The notes are adequate reminders, so there is no required reading. You might want to consult a statistics or econometrics book with which you are familiar.<br>Introduction to financial econometrics: Brooks, 2 <sup>nd</sup> edition, Chapter 1<br>Linear regression and factor models: Brooks, Chapters 3-4<br>Bayesian analysis: Kennedy, chapter on “The Bayesian Approach” from A Guide to Econometrics<br>Event Studies: Brooks, Chapter 14, section 9; Campbell, Lo and MacKinlay, Chapter 4; suggested additional reading is Kothari and Warner |
| 2                  | January 26                             | Univariate linear time series: Brooks, Chapter 6   |
| 3                  | January 27                             | Multivariate linear time series analysis: Brooks, Chapter 7<br>Long-run relationships: Brooks, Chapter 8   |
| 4                  | January 28                             | Long-run relationships (continued): Brooks, Chapter 8<br>Volatility: Brooks, Chapter 9   |
| 5                  | January 29                             | Nonlinear time series: Brooks, Chapter 10 and “ <a href="#">Nonlinear time series and financial applications</a> ”, Dwyer<br>Introduction to Value at Risk: A Gentle Introduction to the RM 2006 Methodology, Gilles Zumbach; suggested additional reading is Simulation: Brooks, Chapter 13<br>Value at Risk and the Financial Crisis: Finger 2008; Dowd 2013, esp. pp. 1-13  |

**BIOGRAPHICAL NOTE:**

Gerald P. Dwyer is Professor and BB&T Scholar at Clemson University. Most recently he was Director of the Center for Financial Innovation and Stability and Vice President at the Federal Reserve Bank of Atlanta. Prior to joining the Atlanta Fed, Dr. Dwyer was a faculty member at research universities and a visitor at various Federal Reserve Banks. He is a past President of the Society for Nonlinear Dynamics and Econometrics, which honoured him by creating the Gerald P. Dwyer prize in Financial Econometrics. He also is a past President of the Association for Private Enterprise Education. His research on financial markets and banking has appeared in leading economics and finance journals, including his recent research on the financial crisis and cryptocurrencies such as Bitcoin. He is co-editor of *Finance Research Letters*, and an Associate Editor of *Economic Inquiry* and the *Journal of Financial Stability*. Additional details are available at <http://www.jerrydwyer.com>.

